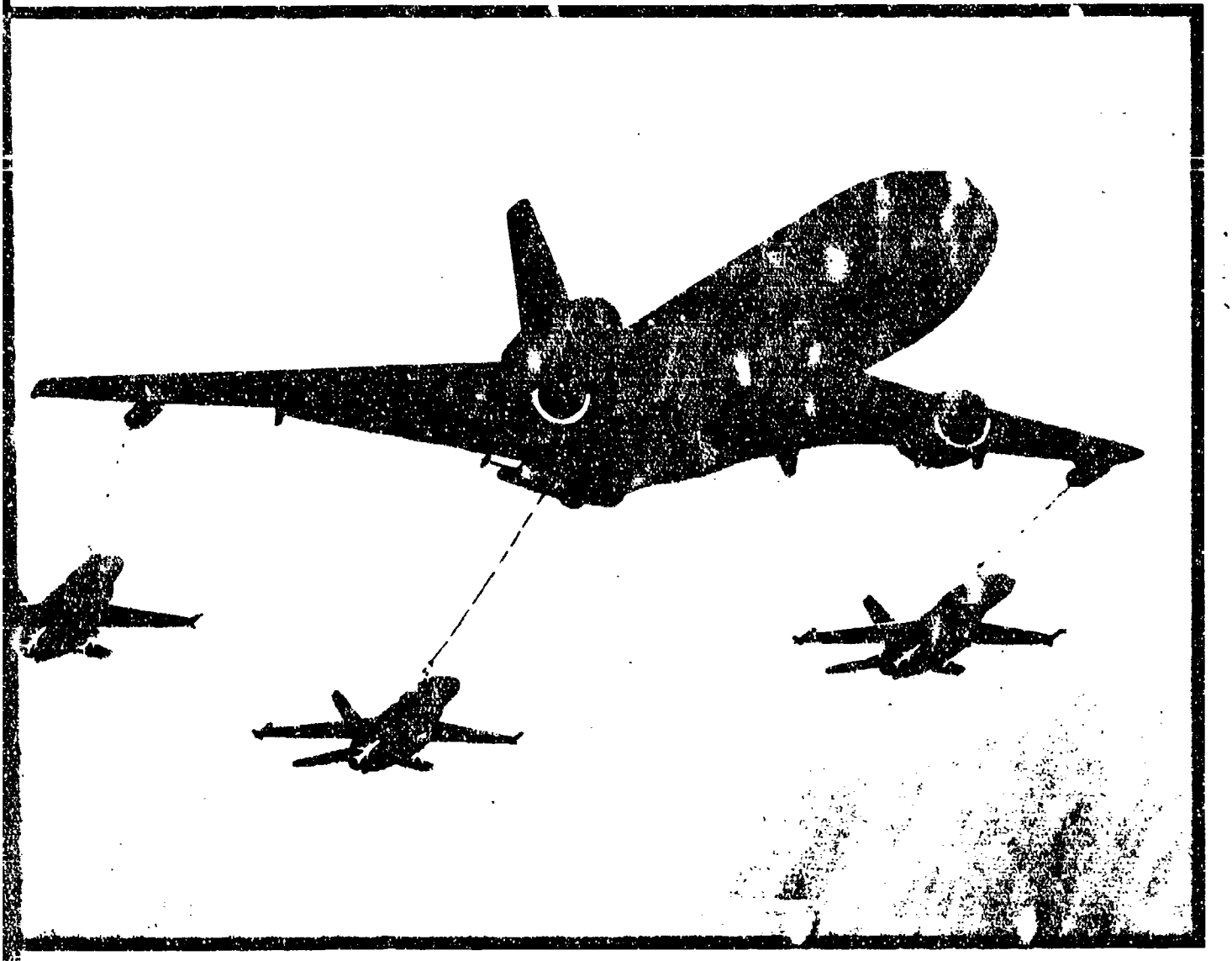
Air Force Air Refueling for Naval Operations

History, Practice, and Recommendations

Lt Col Dennis K. Ryan



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Ryan

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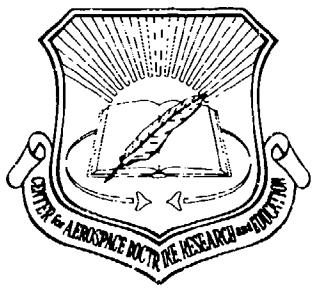

Research Report No. AU-ARI-89-10

Air Force Air Refueling for Naval Operations

History, Practice, and Recommendations

by

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Research Fellow
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Foreword

Today's requirement for air refueling is the same as it was for the pioneers of aviation in the 1920s. That is, aviators still desire to increase operational range while they carry maximum payloads. Accordingly, this desire has led to the creation of tanker aircraft for the United States Air Force. The tanker seeks to enhance the mission capability of its receiver, whether it is a bomber, fighter, or reconnaissance aircraft or airlifter or another tanker aircraft. Due to this enhancement, almost all US military aircraft produced today are air refuelable. Therefore, air refueling is the same in the 1990s as it was in the 1920s, when it was first deemed feasible.

The time has arrived to review the strategy and doctrine of the US Air Force tanker aircraft so they can be more fully utilized in support of our national security objectives. From the introduction of the first all-jet tanker, the KC-135, officials tended to view this aircraft as an asset primarily in support of the single integrated operational plan (SIOP). However, the conflict in Southeast Asia proved KC-135s were invaluable in providing extended range and increased payload and allowing operational flexibility for all types of aircraft. The Asian experience also demonstrated a need for a multipurpose tanker—one that could support not only US Air Force aircraft but also Navy assets during the same sortie.

As a result, in the mid-1970s plans were made to produce a new wide-body tanker aircraft. This KC-10 aircraft had a built-in advantage over the KC-135; that is, the addition of hose-reel equipment as well as the flying boom. The advantage was immediately apparent. Both US Air Force and Navy aircraft could air refuel from the same tanker during a single-tanker sortie.

Concurrent with the KC-10 becoming operational, changes began to occur within the world environment. Conflicts among nation-states were fragmented, or consisted of low-intensity conflict or terrorist activity. As an instrument of national power, the president has recently focused on using carrier battle groups to show national resolve in response to these problems. However strong the carrier battle group, like the Strategic Air Command and Tactical Air Command, could significantly increase its operational range by use of land-based tankers. The tanker augmentation could allow naval air power to strike, while steaming to or from a crisis area, or could allow the carrier to place itself out of range from a perceived or known threat, while still covering designated target areas.

Early in the 1980s both the Navy and Air Force began to realize the importance of operational improvements gained through the use of KC-135s and KC-10s. Accordingly, the Air Force and the Navy signed a formal memorandum of understanding in 1981 and moved toward joint use of

these JCS-controlled tanker assets. Unfortunately, joint use has not been fully developed, because most joint actions have occurred during crisis situations and have been planned on an ad hoc basis. Therefore, we have found ourselves relearning the lessons of the last crisis. Now is an appropriate time to formalize US Air Force air refueling support of carrier aircraft during limited attack options by creating a concept of operations.

The concept must be directed at, and written for, the operators of both services. Once adopted, the concept will provide naval personnel with the capability to refer to a joint manual or concept, review their tasking and targets, interpret the threat, and decide if land-based tanker support increases their flexibility, provides alternatives, or increases the probability of mission success. This new joint manual also will provide the answers to who, what, when, where, and how much. The Navy only has to set the wheels into motion as described in the concept. Like all military operations, this decision should be left to the commanding officer. Once land-based tankers have been requested and JCS has approved them, the Strategic Air Command (SAC) would respond to the commanders' needs.

Accordingly, this paper provides a draft concept of operations that allows Headquarters SAC to coordinate between Headquarters US Air Force and the Department of the Navy. The author assumes on final coordination that a joint manual will be published and put into operational use. Prior to the concept, however, a review of Air Force and Navy air refueling, as it has evolved to date, should provide a perspective on the importance of the subject.

Last, I believe Navy and Air Force commanders should use this paper and the draft concept of operations to make decisions on the use of land-based tankers during limited-attack options. The document is aimed at providing the Navy the opportunity to make the decision to augment its airborne operational range, while maintaining the carrier in a low-to-no-threat environment. The author's underlying assumption is that the naval commander in charge of the carrier battle group will be given the opportunity to request and employ the land-based tanker augmentation capability as needed in his current environment.

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About the Author

Lt Col Dennis K. Ryan

Lt Col Dennis K. Ryan entered military service in 1969. After graduation from Officer Training School, he was commissioned in March 1970. He then entered undergraduate pilot training (UPT) at Williams Air Force Base (AFB), Arizona. Upon graduation from UPT, Colonel Ryan first served as a KC-135 copilot for the Strategic Air Command at Grand Forks AFB, North Dakota. During the Grand Forks tour, Colonel Ryan participated in the Southeast Asian conflict as a KC-135 pilot at Kadena Air Base (AB), Japan; U-Tapao, Thailand; and Andersen AFB, Guam. In July of 1975 Colonel Ryan was assigned to the Pacific Tanker Force as an instructor pilot and as an operations planner at Andersen AFB. In 1977 he moved to the Third Air Division as the Strategic Air Command's tanker manager for the western Pacific region. From the period of 1979 to 1983, Colonel Ryan was assigned to Headquarters USAF, Strategic Division, as an action officer working KC-135 and KC-10 operational and budgetary matters. In 1983 he attended Air Command and Staff College where he remained on the faculty for a two-year period. In 1986 Colonel Ryan was assigned to Seymour Johnson AFB, North Carolina, as the KC-10 chief pilot, instructor pilot, and later operations officer. He was selected as the SAC-sponsored visiting research fellow at the Airpower Research Institute, Maxwell AFB, Alabama, in 1988.

Colonel Ryan received a bachelor of science degree from Indiana University in 1967 and a master of arts degree from Pepperdine University in 1977. He is a graduate of Squadron Officer School, Air Command and Staff College, and Air War College.

Preface

The premise of this study was conceived as the KC-10 was being procured in the early eighties. It became apparent very early in the operational cycle that a dual air refueling-capable, land-based tanker could operate in conjunction with a carrier battle group and could significantly increase naval air flexibility, fire power, and range due to the increased amount of fuel made available. Unfortunately, the demands of daily operations, budgetary matters, and staff work precluded the opportunity for research and coordination with the appropriate personnel. As the command-sponsored visiting research fellow program became available, it presented the perfect opportunity to research and draft a concept of operations for Air Force land-based tanker support for carrier battle groups. As the research was in progress, the Air Force and Navy signed a new (1988) memorandum of understanding (MOU). In the MOU, a new attachment specifically called for such a document (concept of operations) to be produced. Accordingly, the first three chapters of this project represent research into the history of Air Force/Navy air refueling, attempts toward joint air refueling concepts, and the need to formalize joint operations at the squadron and air wing levels. Appendix A presents a draft concept of operations and is not intended to represent research per se. Appendix B includes the Air Force and Navy agreements pertaining to air refueling. Lastly, this product is a result of years of KC-135 and KC-10 operational and staff experience that has been interwoven into the draft concept of operations aimed directly at providing the how, who, when, and where of land-based tankers for naval air operations. I firmly believe that effective use of the concept can not only increase the power and strength of naval air wings but also enhance the strategy of the Department of Defense and provide the national command authorities alternatives previously not available.

I want to thank Dr Lawrence Grinter and Dr Richard Bailey for their support and guidance throughout this project. Special thanks are given to Mrs Dorothy McCluskie and her staff for the outstanding help provided during the production phase. Last, the continued backing and support provided by my wife and children are truly appreciated. I thank each and every one of you.

Dennis K. Ryan

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Chapter 1

Significant Events in the Evolution of Air Refueling

Maj Henry H. ("Hap") Arnold was one of the first individuals to recognize that air refueling could solve early aviation problems with flight endurance and payload. In 1924 he wrote an article formulated from the collective opinion of several officers after they had witnessed an unrefueled flight of 35 hours and 18 minutes. Major Arnold stated:

> The limit for sustained flight with airplanes had been reached unless some means could be developed whereby gas and oil, and possibly other supplies, could be furnished to a plane in the air from other sources. It was believed that if refueling was demonstrated feasible, new records could be created and a new field opened up in aviation which might prove of value to the science in general.[1]

This statement along with several earlier experiments contributed to the evolution of air refueling.

The first actual air refueling was performed on 25 June 1923 near San Diego, California, by Lts Virgil Hines and Frank Seifert as they flew their tanker within 35 feet of the wing tip of Capt Lowell Smith and Lt John P. Richter's receiver aircraft. This flight marked the first time a tanker transferred fuel to a receiver. To accomplish this in-flight refueling, Hines and Seifert lowered a 40-foot hose to the receiver, and Smith and Richter fastened it into the fuel tank. It is interesting to note that this experiment was conducted primarily in preparation to break existing flight-endurance records and not to prove the advantages of air refueling.[2]

Throughout the mid-1920s numerous air refuelings were accomplished, and new endurance records were set. Captain Smith and Lieutenant Richter were at the forefront of these accomplishments. Unfortunately, air refueling still was not regarded as the acceptable method to overcome endurance and payload problems. This changed, however, when the *Question Mark* landed on 7 January 1929.

Flight of *Question Mark*

Question Mark, by using aerial refueling, exceeded all endurance records by remaining aloft for 150 hours, 40 minutes, and 15 seconds. This flight shocked the aviation world as it traveled the equivalent of 11,000 miles during its six-day flight. Along with the endurance record, several other significant events took place.[3] These events included:

- Having only 100 gallons of fuel in tanks at time of takeoff, thereby creating the requirement for air refueling.[4]
- Flying nonstop for 11,000 miles, thus demonstrating the increase in the radius of operation for military aircraft.
- Making a total of 37 air refueling contacts, totaling about four hours of "hookup" time. This proved the reliability of air refueling.[5]
- Accomplishing several night air refuelings. This demonstrated that air refueling was not limited only to daytime operations.[6]
- Transferring over 5,000 gallons of fuel and 250 gallons of oil to the receiver from several tanker sorties. This pointed toward the future use of a tanker-specific aircraft.[7]

Upon landing, the crew, which consisted of Maj Carl Spaatz, Capt Ira Eaker, Lt Elwood Quesada, and Lt Harry Halveson, and mechanic Roy Hooe, believed that no one could doubt the success of aerial refueling. In addition, they believed that air refueling had been proven practical and therefore possessed both commercial and military advantages.[8] In fact, Major Spaatz, as the commanding officer of the flight, pointed out that

> from a military standpoint the successful demonstration of refueling means that bombing planes can now take off with heavy loads of bombs and little gasoline, refuel . . . and continue to a more distant objective than would otherwise have been possible.[9]

Major Spaatz also foresaw the construction of tankers and stated:

> In the near future . . . designers will build large transport planes especially for refueling.[10]

Without a doubt the flight of *Question Mark* was a milestone in the development of early aviation and led to further experiments and interest in air refueling. The US Army, however, discontinued experimentation with refueling after the flight of *Question Mark*. Although no official reason is given for the discontinuance of air refueling, it is the opinion of the author that it was based on two factors. One, the flight of *Question Mark* demonstrated that long-distance travel was now made possible. Two, the air refueling concept itself had been proven successful, and no further experimentation was felt necessary.

Civilian and British Interest in Air Refueling

For the remainder of 1929 and through 1932, the civilian community became interested in air refueling and one Englishman foresaw its potential. The civilian interest in air refueling was centered around using air refueling as a means to break endurance records and not to develop air refueling per se. However, because of this the air refueling concept continued to evolve and grow as a result of repetitious use. The aforementioned Englishman was R. L. R. Atcherly, a squadron leader in the Royal Air Force. He witnessed an air refueling while in the United States and took this idea to Great Britain with plans of his own.[11]

After experimentation, Squadron Leader Atcherly developed his technique for air refueling, and, more important, caught the interest of Sir Alan Cobham, who, in 1936, formed the first private company devoted solely to the development of air refueling. This company—Flight Refueling Limited, after several years of experiments and limited trans-Atlantic operations—developed the expertise that would serve as the foundation for air refueling in future years.[12] Unfortunately for air refueling, in 1939 the immediate task at hand for the British became the Germans and World War II.

Because of World War II and the fact that in-flight refueling would be extremely difficult for the mass night bomber attacks, air refueling was not considered. The Air Ministry did, however, use the personnel of Flight Refueling Limited on other war projects, which kept the expertise together.[13]

United States Renews Interest in Air Refueling

As the British were drawing down on their experimentation with air refueling, the United States began to renew its interest. More specifically, in 1941 the United States wanted to develop a long-range bombardment capability to retaliate against Japanese aggression. During this time the United States asked the British for information regarding air refueling, because no development had occurred within the Army Air Service since 1929. The British obliged, sending Squadron Leader H. C. Johnson to Eglin Field, Florida. Men and equipment were also sent to Florida and early in 1943 air refueling tests proved successful. However, due to US production of the B-29 Superfortress and its long-range bombing capability, further development of air refueling did not occur. But, now interest had shifted from endurance attempts to developing a real military capability. The dropping of the atom bomb in 1945 brought the war to an end and along with it any need for air refueling.[14]

After World War II the United States was busy drawing down its conventional capability. However, the age of strategic warfare was just beginning, and along with it came a renewed United States interest in air refueling.

The Strategic Air Command (SAC) was established on 21 March 1946. Gen Carl Spaatz, commanding general of the Army Air Force, articulated its mission:

> Be prepared to conduct long-range offensive operations in any part of the world, either independently or in cooperation with land and Naval forces.[15]

To support this statement the Air Force, which was created in 1947, decided that air refueling was the only answer to achieving global capability. Accordingly, 25 years after Captain Smith and Lieutenant Richter proved air refueling was feasible the US Air Force turned to Britain and Flight Refueling Limited for help. SAC ordered appropriate equipment from Flight Refueling Limited to convert 100 B-29s to receivers and 60 B-29s to tankers. The Boeing Company was awarded a contract to install the hose-type equipment and at the same time technicians at Wright Field, Ohio, were told to develop an American air refueling system. Priority was given to the project as the US Air Force and the US Navy competed to show Congress who was better suited for custody of the atom bomb.[16]

The demand for an air refueling capability was now on the front burner, and a demonstration flight before several congressmen on 24 March 1948 proved it could be done. During this flight a B-29 tanker transferred 440 gallons of antifreeze to its mated receiver. Although not spectacular the flight convinced the congressmen of the merits of air refueling. Accordingly, SAC and the Air Force were tasked with the responsibility to deliver the atom bomb, if need be.[17] This new mission truly accentuated the need for air refueling and ensured it would become the legs of the Air Force. As a result of being tasked with delivery of the bomb, SAC wanted to prove its worldwide capability and did so with a B-50 nicknamed the *Lucky Lady*. On 26 February 1949 the aircraft lifted off from Carswell AFB, Texas, and after being refueled four times by KB-29 tankers at various points, returned after circling the globe. The nonstop flight took approximately 94 hours, covered 23,108 miles, and clearly illustrated the capability of the Strategic Air Command. It also highlighted the importance of air refueling.[18]

Nonetheless, the current hose equipment used for air refueling was not compatible with the evolving jet aircraft. To answer this problem, Boeing was asked to provide a better air refueling system, one that could provide faster flow rates and higher speeds. The answer was the flying boom which eventually became the standard for SAC, as shown in figures 1 and 2.

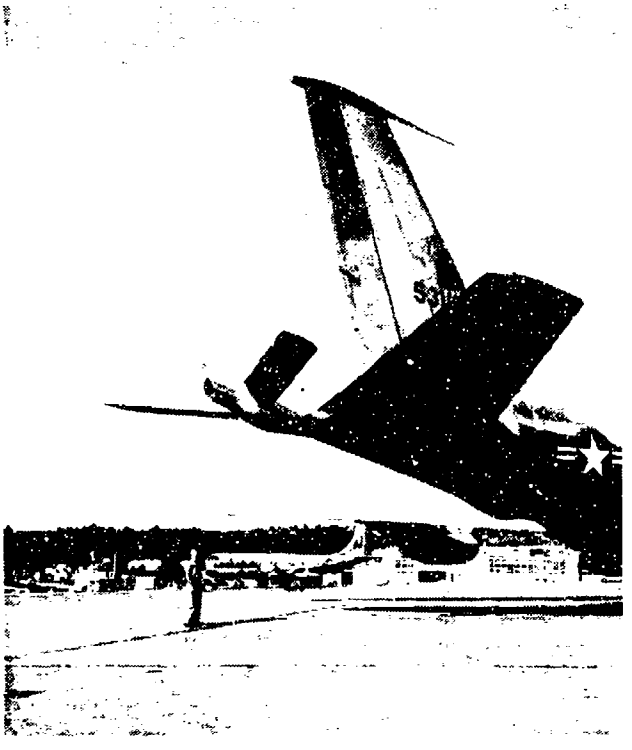

Figure 1. KC-97 (Distant) and KC-135 (Foreground) with Boom Attached.

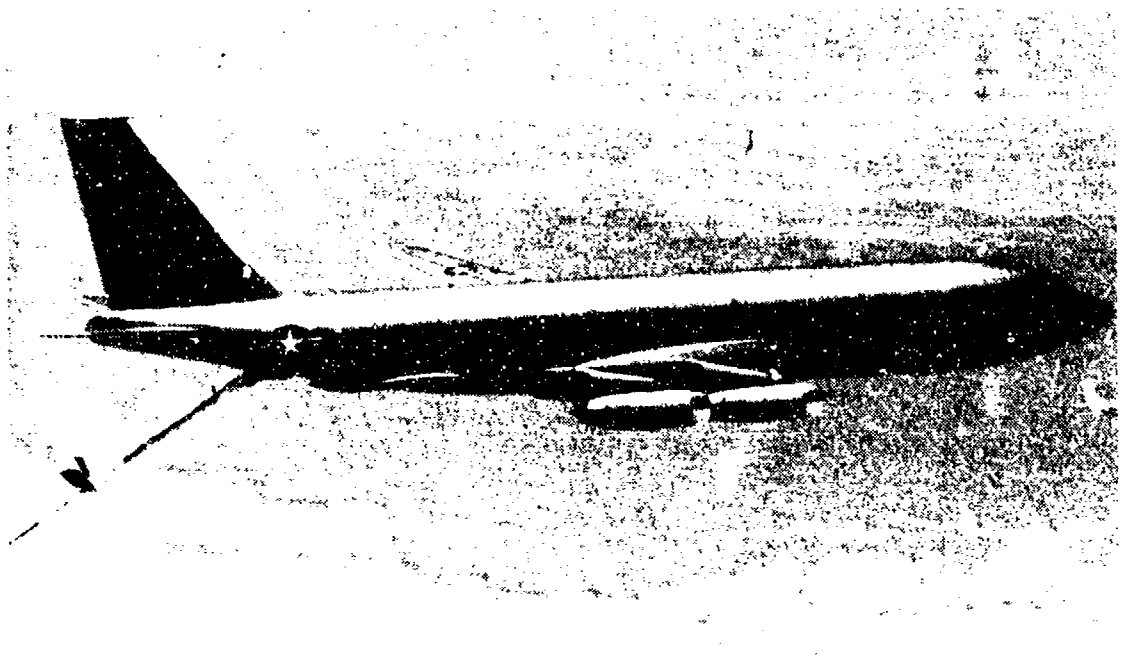

Figure 2. KC-135 with Flying Boom in Lowered Air Refueling Position.

Tactical Air Command, however, took another path and, after working with Flight Refueling Limited, began to use a hose-drogue method for its single-seat fighters, as shown in figure 3. Therefore, in the early 1950s the Air Force began to develop two different and incompatible methods of air refueling: the flying boom method for SAC and the hose-drogue method for TAC.[19]

Strategic Air Command Develops a Tanker Fleet

By 1 September 1950 the flying boom was ready to join the active inventory and did so on a KB-29P at Biggs Field, Texas. Prior to this all KB-29 tankers were equipped with the British-made hose refueling system. The flying boom marked the beginning of air refueling modernization for SAC and led to the establishment of more capable tankers. After the introduction of the KB-29 in the late 1940s, SAC began to receive the KC-97 in 1951. The KC-97, with the flying boom, became standard equipment for SAC and was capable of flying fast enough to refuel the new B-47. It gave the B-47 a truly intercontinental bombing role. The KC-97 remained the primary tanker for SAC until 1957, at which time the KC-135 began to enter the inventory.[20]

From the initial introduction of tankers in 1948, SAC had grown from two air refueling squadrons to 40 squadrons in only nine years. During

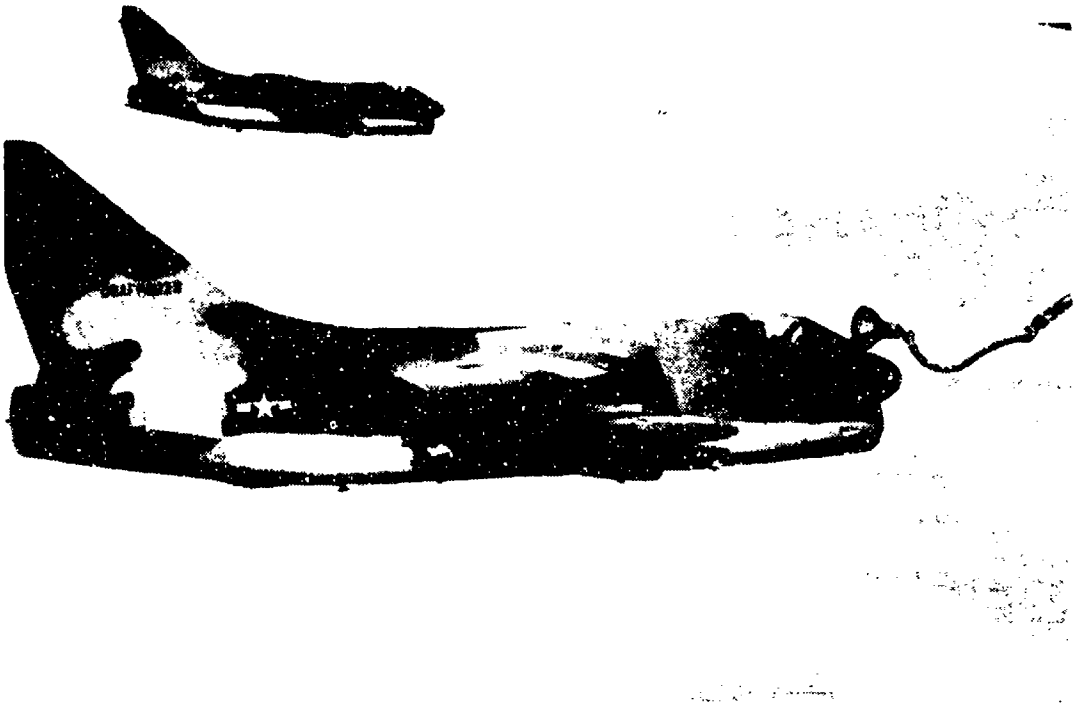

Figure 3. A-7 Probe Refueling.

this period air refueling had grown from an unaccepted concept to the production of tanker specific aircraft; and by 1957 its 766 tankers comprised over 39 percent of the Strategic Air Command's total aircraft inventory.[21]

Tactical Air Command Desires Tankers

Realizing its need for tankers, Tactical Air Command (TAC) had been trying to obtain them since 1949. Unfortunately, TAC did not receive tankers until 1954, when the command had to settle for old KB-29s. Two years later, TAC obtained old KB-50s with probe and drogue capability.[22] However, neither the KB-29 nor the KB-50 bomber satisfied TAC's need for high-altitude, fast-moving tankers. To help alleviate TAC's problem, the drogue adapter kit was developed to allow probe-equipped fighters to refuel from the boom-equipped SAC KC-135s. This device, a rubber hose hooked onto the end of the boom, had a drogue or basket located on the end, as shown in figure 4. However, its inherent drawback was that the modification had to be done on the ground and when completed allowed only probe-equipped aircraft to air refuel. Figure 5 illustrates this drawback.

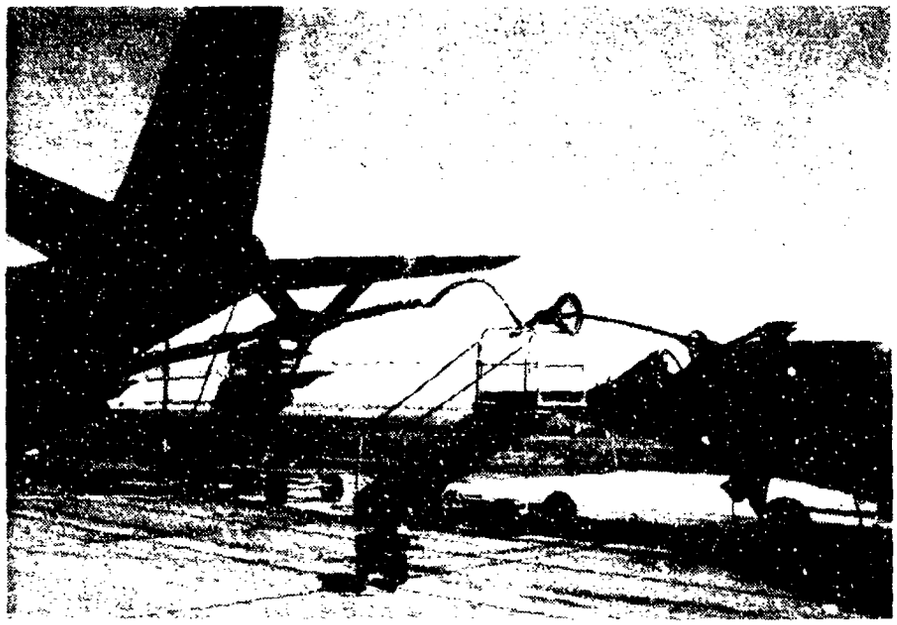

Figure 4. KC-135 Boom Drogue Adapter Kit.

Figure 5. KC-135 Illustrating the Boom Drogue Adapter Kit Attached to the Boom.

The situation was an interim fix, however, as TAC still desired control of its own tanker fleet.

United States Navy Develops Tankers

Like TAC, the Navy became interested in the use of air refueling in the early 1950s. In fact, air refueling tests were performed at the Naval Air Test Center using F9F- and F2H-type aircraft as receivers behind an XAJ-1 tanker aircraft in 1952. The hose-drogue method was used, and the Navy was convinced air refueling would significantly increase its operational capability.[23]

In 1955 as a result of the tests the Navy began to either modify existing fighters or to configure production fighter aircraft with probe-drogue equipment. Concurrently, the Navy converted AJ bombers to tankers by replacing the bomb bay with fuel tanks. The equipment was bought and engineered by Flight Refueling Limited of Great Britain.[24]

In 1957 the Navy replaced the AJ tanker, as its size required a large amount of carrier deck space. The replacement tanker was the AD-6 aircraft that had been converted into a "buddy" tanker role.[25] Under the buddy air refueling concept, a small attack-type aircraft, such as the A-4 Skyhawk or the A-6 Intruder, was configured with a belly-mounted drogue and reel system. In addition, the aircraft could be fitted with auxiliary wing-tip fuel tanks. In this configuration, a Navy probe-equipped receiver aircraft could obtain fuel from a similar or buddy-type aircraft.[26]

As a result of adopting the buddy concept, the Navy began to use the Grumman KA-6D Intruders as its standard buddy tanker. The KA-6D has been configured with a drogue and reel system in its lower fuselage.[27] Operating as a tanker, it has limited air refueling ability, as compared to SAC's large land-based tankers. However, the KA-6D can off-load 21,000 pounds of fuel immediately after takeoff from the carrier, or it can provide 16,000 pounds at a distance of 260 nautical miles from the ship.[28] Each carrier air wing is usually equipped with four KA-6D tanker aircraft. Additionally, all A-6 aircraft that are aboard the carrier can be equipped with a buddy store, enabling it to act as a tanker. A total from 13 to 20 buddy tankers can be made available. However, each A-6 that is performing as a tanker loses its attack capability.[29]

The Marine Corps also has developed an air refueling capability. After its initial use of older model aircraft, the Marines procured several GV-1 (KC-130F) tanker aircraft.[30] Although this provided an additional fuel-transfer capability, it still did not match the airspeed needs of the recent model jet aircraft. The GV-1 has traditionally been used for transoceanic moves as well as helicopter refueling.

Therefore, the decade of the 1950s brought about a proliferation of air refueling assets within the Air Force and the Department of the Navy. Unfortunately, each service acted independently without regard to inter-

operability or joint use. The Air Staff realized the problem and in 1959 proposed an alternative.

Single Manager System

The Air Staff provided the alternative in November 1959 and aimed it at ensuring responsiveness to all users. The proposal, Department of Defense Instruction (DODI) 5160.12, asked SAC to develop a single manager system that would ensure a standard air refueling system for the Air Force. The new proposal also outlined two objectives: to eliminate any duplication of effort within the Air Force and to improve the efficiency of operations within the Department of Defense. As an outgrowth of the efficiency objective, Gen Curtis LeMay also decided that all bomber aircraft and all future Air Force fighters would be equipped with a receptacle. This decision closed the loop, as today all Air Force aircraft use the boom-receptacle refueling method. This policy came into effect in November 1961, and the single manager system has served the Air Force and Department of Defense to this date.[31] In fact, the SAC single manager system, using a combination of KC-135A/R/Es, has grown from serving only SAC and TAC in the 1960s to serving the Navy and Marines and allied nations in the 1970s and the 1980s.

Air Refueling in Southeast Asia

Air refueling proved its worth for tactical aircraft in Southeast Asia (SEA). Until the Vietnam conflict KC-135s were traditionally viewed as strategic tankers, primarily mated to their emergency war order bombers (B-52s). In fact, the first combat use of KC-135s and air refueling occurred over South Vietnam on 9 June 1964, when four KC-135s refueled eight F-100s and started a new era for air refueling. From this point on SAC KC-135s and air refuelings were used to support daily combat operations. In the nine years and two months of operations, KC-135s provided 813,878 refuelings and transferred over 1.4 billion gallons of jet fuel. In support of tactical aircraft alone, the tankers provided 124,223 sorties and 756,970 air refuelings.[32]

Not only did the KC-135s provide refuelings, they also provided both aircrews and commanders with the key to air power, which was flexibility. The receiver aircraft could now strike from a longer range, carry more munitions, and remain on station for increased periods. In addition, numerous aircraft "saves" were made. A save occurred when a receiver was unable to return to base due to combat damage or contained inadequate fuel to reach the point of intended landing. On several occasions SAC tankers provided emergency fuel. The most famous example was a three-deep refueling.

In May 1967 a KC-135 equipped with a drogue (for a US Air Force F-104 refueling) obtained an emergency request from the Navy to help two A3 aircraft (also refueling capable) who were short of fuel. As the KC-135 responded, two other Navy F8 aircraft also became short of fuel. After the rendezvous the SAC tanker found itself passing fuel to a Navy A3, who was passing fuel to an F8 at the same time! Actions such as this saved millions of dollars, but more important, they saved the lives of crew members.[33]

In effect, air refueling matured during the Southeast Asia conflict. The tremendous accomplishment ensured air refueling to be an integral part of US Air Force tactical operations. The conflict also highlighted the need for more Air Force/Navy joint doctrine, tactics, and operations.

For many reasons joint operations did not take place but two specifically stand out. First, both services operated independently. Accordingly, the KC-135s were configured for Air Force boom refuelings and were tasked to support Air Force operations. However, some older Air Force receiver aircraft were not boom capable but were still probe equipped. This allowed some interface between the services, as KC-135s could be called on to refuel Navy aircraft. This was the exception, as in a save rather than a planned operation.[34] Second, the Navy had their own buddy tanker fleet. The buddy concept worked well for the Navy because the carriers operated from the Gulf of Tonkin, where they could be close to their interdiction targets.[35] Because of these factors joint Air Force/Navy operations did not mature. But planners in both services began to realize that increased capabilities could be achieved through a dual-capable tanker (boom/drogue).

Introduction of the KC-10

As air refueling evolved during the 1950s and 1960s, the operators and planners within the Defense Department took notice. As a result nearly all aircraft procured after the 1960s were constructed with a receiver air refueling capability. Additionally, others, such as the entire C-141 fleet, have been modified to have an air refueling capability. An increase in the number of receiver aircraft in the late 1970s created a need for more tankers. Due to this fact studies were conducted to identify a new advanced tanker. Of all the enhancements desired, one stood out as being able to provide maximum flexibility and interoperability. This enhancement called for the tanker to have both a boom and a hose-drogue assembly installed, as shown in figure 6. When completed the dual-capable tanker would allow either Air Force, Navy, or Marine receiver aircraft to refuel from a single airborne tanker. As a result, the initial plan for the new tanker incorporated both capabilities—boom and hose-drogue. Additionally, the tanker itself was to be manufactured with a refueling receptacle, allowing it to perform as a receiver and to onload fuel from another tanker, as shown in figure 7. After considering several commercial wide-body aircraft, the Defense Department awarded the McDonnell Douglas Company a contract to build

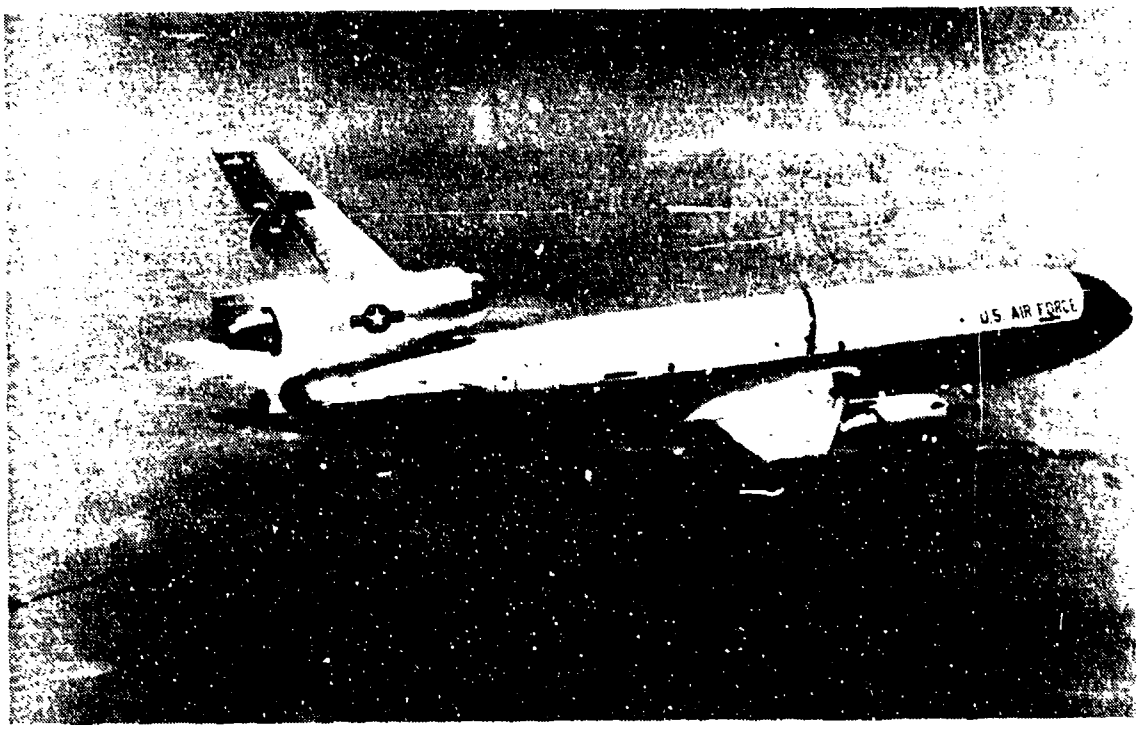

Figure 6. KC-10 with Boom Stowed and Hose Drogue in Trailing Position.

a military version of the DC-10, designated as the KC-10 Extender. By the end of fiscal year 1988, a total of 60 KC-10s had been built.

As the KC-10 was being procured and was becoming operational, personnel in the Air Force and the Navy were aware of the need to improve interoperability and compatibility for the enhancement of combat effectiveness. As a result the services, in 1976 and specifically in 1981, signed a memorandum of understanding which listed provisions to ensure interservice compatibility, thus paving the way toward more joint agreements and making a significant step toward a joint, flexible, and combat-effective force.[36]

Summary

Initial attempts at air refueling were conducted mainly to increase the endurance of the early aircraft. Later, in the mid-1940s, aerial refueling was viewed as an interim solution to provide greater range so bombers could strike at long-range targets in Japan. It wasn't until the end of World War II, when the need arose to develop a true worldwide bombing capability, that air refueling became accepted as the answer to the range and payload problem. In the 1950s SAC, TAC, and the Navy developed their own

Figure 7. KC-10 Approaching Receiver Air Refueling Position behind Another KC-10.

independent, and limited, air refueling capability. As a result Headquarters US Air Force asked SAC to establish an efficient single manager system. Becoming effective in 1961, the system has been responsive to the needs of the Defense Department and has ensured equitable support for all users of air refueling. Since its inception the single manager system and Air Force tankers have refueled Navy and Marine aircraft and the aircraft of allies.

The Southeast Asia conflict also helped in the evolution of air refueling as it proved that air refueling could significantly increase tactical range, weapons payload, and loiter time. Additionally, the Vietnam era highlighted the need for joint Air Force/Navy tanker compatibility. This era also illustrated the need for more tankers, as there was a proliferation of receiver aircraft. In 1981, as the KC-10 was being procured, an Air Force/Navy joint memorandum of understanding was signed by the chiefs of the Air Force and Navy, marking the beginning of future efforts toward joint operation and compatibility. These joint efforts became increasingly important, since by the end of 1988 SAC, as the single manager of tankers, had at its disposal 638 KC-135/A/R/E-type aircraft and 59 KC-10s.

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Chapter 2

Efforts Toward United States Air Force/Navy Joint Operations

Formal joint air refueling operations between the Air Force and Navy began to evolve during the early 1970s. Prior to this time each service had developed its own independent tanker fleet based on different requirements. The Air Force developed the KC-135 for in-flight refueling of the strategic bomber force, and the Navy developed the KA-6D tankers to support their fighter "buddy" air refuelings from carriers. The war in Vietnam proved KC-135s could significantly increase tactical aircraft flexibility and firepower. In addition, the war proved tankers could move large numbers of fighter aircraft quickly over the oceans as well as refuel naval aircraft. In effect, the Southeast Asian conflict highlighted the need for joint Air Force/Navy air refueling operations whereby Air Force land-based tankers could support Navy aircraft.

As a result, action officers within each service began to develop procedures and agreements aimed at enhancing joint operations. The first formal agreements occurred in November 1971 and in May 1973 and signaled the beginning of the evolution of joint air refueling.[1]

Jointness Grows in 1975–76

A significant move toward joint operations was not made until 20 August 1975. On that date the secretary of defense, James R. Schlesinger, directed the Air Force to provide air refueling support for the Department of the Navy. This direction was provided in an amended program decision memorandum (PDM) and subsequently paved the way for future Air Force/Navy cooperation.[2]

The first action taken because of the PDM was a joint Air Force/Navy Memorandum of Agreement (MOA) signed in July 1976. This agreement provided for Air Force tanker support for transoceanic movement of naval aircraft and for naval aircrew air refueling familiarization training prior to such movement. The agreement also included support for the movement of Marine Corps aircraft when organic Marine tankers (KC-130s) were unavailable[3] (see appendix B).

Memorandum of Understanding of 1981

The services operated under the MOA of 1976 until it became clear that further interservice interoperability could enhance operations in both the Air Force and the Navy. One such enhancement concept was proposed by the Interservice Air Refueling Systems Advisory Group (ARSAG) in 1981. This group was composed of individuals from the Aeronautical Systems Division, the Naval Safety Center, the Air Force Inspection and Safety Center, and among other DOD agencies, the Naval Air Systems Command. Selected air refueling operators, staff experts, and participants from private industry complemented these organizations. The group promoted safe, efficient, air refueling interoperability and compatibility among all users. After several meetings the group proposed that the Navy and the Air Force review air refueling interoperability as it stood in 1981. Both services did so and concluded

> that although the separate systems being employed by the Navy, Marine Corps, and Air Force have evolved for good and logical reasons, the effect has been a limited interservice compatibility.[4]

To rectify the problem the Navy and the Air Force formulated a new memorandum of understanding (MOU) that was signed on 10 July 1981. The explicit purpose of this memorandum was to

> provide mutually agreed parameters in the pursuit of improving Air Force and Navy interoperability and compatibility towards the enhancement of our combined combat effectiveness.[5]

Of major importance within the provisions of the MOU was that future development of aerial refueling tanker aircraft would ensure interservice compatibility. Also, that all general support tanker aircraft (e.g., the KC-10) "will be equipped with aerial refueling systems compatible with both probe and receptacle equipped receiver aircraft."[6] Therefore, the memorandum of understanding of 1981 set into concrete Navy/Air Force future interservice compatibility (see appendix B).

Memorandum of Understanding of 1982

On the heels of the 1981 agreement, the services began to realize there were still other areas where Air Force/Navy cooperation could prove beneficial. To capitalize on these areas another memorandum of understanding was constructed and signed on 9 September 1982. This agreement was geared to accelerate joint efforts to enhance the effectiveness of maritime operations specifically in defense of the sea line of communications (SLOC) by using Air Force capabilities. The antiair warfare mission was considered the most immediate area of gain where the Air Force could help. However, air refueling was included because it could provide valuable enhancements

to the defense of the SLOCs. The memorandum also included several objectives. The first objective was the desire to develop joint tactical doctrine for maritime operations, and the second objective was the desire to develop joint maritime war-fighting concepts for JCS and CINC consideration and force allocation.[7] In effect, the agreement of 1982 enhanced interservice cooperation and helped improve force integration (see appendix B).

Memorandum of Understanding of 1983

The next step toward jointness came only one year later on 19 September 1983. At this time the Air Force and the Navy signed another memorandum of understanding that built on and expanded the previous agreements. Its purpose was

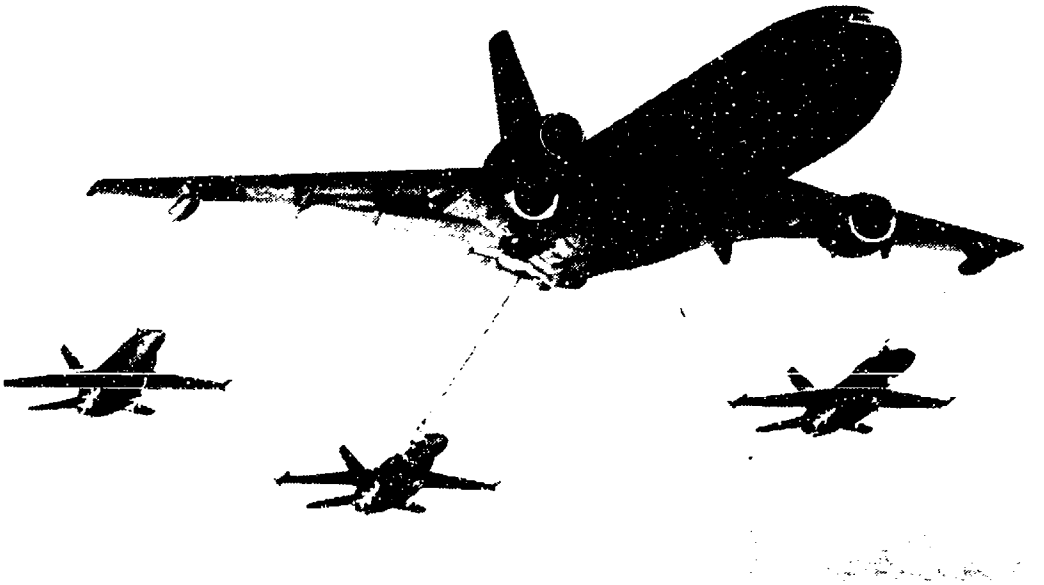
> to provide . . . an interservice support agreement (ISA) . . . to establish Air Force air refueling and aircraft delivery support for the Department of the Navy Aircraft (USN/USMC) and Navy Foreign Military Sales aircraft deliveries.[8]

Prior to 1983 Air Force air refueling support for missions other than those listed in previous agreements required a case-by-case waiver. Accordingly, the intent the agreement of 1983 was to streamline Navy aircraft deliveries and Navy familiarization air refueling requirements into the normal Air Force tanker scheduling activity. In addition, the MOU included provisions for Air Force tanker support for joint exercise activity. It named the Joint Chiefs of Staff (JCS) as the prioritization/allocation authority for Air Force land-based tanker aircraft. Finally, it provided guidelines to allow naval air refueling requirements to be included in the Air Force tanker planning, programming, and scheduling cycle. The Air Force needed several attachments to ensure this limited integration, and the attachments included instructions on forecasting, scheduling, cost responsibility, and command and control, as well as other areas[9] (see appendix B).

Naval Land-Based Tanker Proposal

Both services have cooperated and continued to use the MOU of 1983 as the guideline for joint operations. However, joint cooperation has not been without problems. A significant problem surfaced in mid-1984. At this time the Department of the Navy developed a proposal to procure its own small fleet of land-based tanker aircraft (LBT) and put the proposal in its budget for fiscal year 1987. The Defense Resource Board (DRB) was interested in the issue and tasked the JCS and Air Force to study the proposal. Concurrently, a congressional committee appropriated $110 million for the Navy proposal, even though the Air Force study showed it

was not cost effective. The Senate Armed Services Committee later denied the Navy request on 18 March 1986. The issue received high-level attention and prompted Sen Barry Goldwater and Sen Sam Nunn to write a letter in which they termed the Navy proposal "unacceptable," due to the fact that the Air Force had a fleet of tankers capable of satisfying the Navy's need. However, as a result of the Navy proposal, the DRB directed the Air Force to modify its 60 KC-10s to a three-drogue configuration (fig. 8) and to procure 40 sets of wing-mounted refueling pods.[10]



Source: Douglas Aircraft Corporation.

Figure 8. KC-10 with a Three-Drogue Configuration.

During the same time the issue was being discussed within the DRB and Congress, the Air Force concluded that the KC-10 was better suited to support the Navy than the KC-135. This information was made available by the chief of staff of the Air Force (CSAF) on 13 December 1985 and no doubt affected the eventual decision made by the Defense Resource Board. As part of the CSAF's package, he proposed as an attachment a new MOU which incorporated much of the language found in the Navy's LBT proposal.[11]

Memorandum of Understanding of 1988

A memorandum of understanding signed on 16 November 1988 stated that it will "broaden the scope of previous agreements and provides for

realistic training and development of employment concepts and tactics appropriate for joint operations."[12] In contrast to previous memorandums, the new agreement increases the training aspect and also calls for the development of tactics for both offensive and defensive land-based tanker maritime support. It also specifically states that

> during times of crisis, contingency, mobilization, or war, Air Force LBT support for Navy requirements will be requested by the Unified CINCs through the Joint Chiefs of Staff (JCS) for prioritization and allocation of resources.[13]

The MOU of 1988 also states that the Air Force "will provide timely support for naval operational and training requirements" consistent with budgeted constraints. The general provision section has, similar to the agreement of 1983, nine attachments that are concerned with scheduling and command and control. As written, the MOU of 1988 supersedes the MOU of 1983 and ensures further force integration. Of major importance in the MOU of 1988 is that it includes one additional attachment, entitled "Operational Concepts," which states that "operational concepts and procedures shall be developed jointly to satisfy the operational requirements of Air Force and Navy forces."[14]

This statement represents a significant change in thought and when jointly accomplished will provide both services an enhanced combat capability. It will also provide DOD and senior decision makers employment alternatives previously unavailable. Appendix E includes the MOU of 1988.

Tanker Management System and Air Force Allocation

Because of the time it has taken to evolve to the MOU of 1988, a workable forecasting, budgeting, scheduling, and tanker support system has also come into existence. The system is designed around the Strategic Air Command (SAC) single manager concept and is either JCS directed or user driven.

The JCS becomes involved in tanker refueling matters in time of crisis, contingency, or war. The JCS determines the allocation of tanker assets during the time air refueling requirements exceed tanker airframe availability in accordance with the Joint Strategic Capabilities Plan and in coordination with Headquarters SAC. The allocation process ensures the single management system is responsive to the needs of competing receiver requirements as set by the JCS. For this reason any request for non-scheduled tankers is made through the JCS to Headquarters SAC, which then tasks its tanker units to support the JCS requirement depending on force status and location.

Air Force Regulation 55–47, *Air Refueling Management*

To facilitate the single management system, the Air Force has devised Air Force Regulation (AFR) 55–47, *Air Refueling Management (K-10 and KC-135)*, to assist users of Air Force tanker aircraft to forecast refueling requirements so SAC can allocate and schedule air refueling support within fiscal constraints. AFR 55–47 also sets accountability procedures and specifically provides for refueling support for the Navy. In general the regulation ensures user integration into the peacetime air refueling activity of SAC's tanker fleet.

On a normal basis a receiver unit determines its air refueling requirement and, in accordance with AFR 55–47, submits its request. After a review the request is included within the allocated Air Force tanker flying-hour budget. SAC then allocates air refueling sorties to the user—in this case the Navy—based on forecast requirements. SAC also determines which aircraft, the KC-135 or the KC-10, is better suited to support the request. The tanker flying time is divided among all users on a percentage basis, if a shortfall occurs. Priority tasking is given to operational missions and exercises.[15]

Naval Air Refuelings Increase

Agreements since 1980 have caused naval and Marine Corps air refueling requests to grow. All refueling activity is tracked and is expressed in terms of tanker sorties that are required to support the activity.[16] Figure 9 is used to illustrate naval growth through fiscal year 1988, which shows a 914 sortie growth or a growth of 491 percent over fiscal year 1980. SAC is currently supporting all Navy/Marine Corps forecasted requirements. In addition SAC tankers have supported major JCS exercises that have involved extensive Air Force/Navy refuelings. Examples include Fleetex, Bright Star, Ocean Venture, and Gallant Eagle, to name a few.

In addition to the preplanned JCS exercises, SAC tankers have frequently been called upon to refuel naval aircraft during international crisis situations. The reason the Navy has recently been chosen as the prime instrument of military power to respond to crisis situations is clearly that they maintain a forward-deployed posture capable of rapid mobility and can operate relatively independent of foreign bases.[17]

However, due to either threat identification, fuel requirements, or distance to the operational area, the Air Force tanker fleet has recently been called on to enhance the operational range of naval air power. The Indian Ocean exercise Gen Charles A. Gabriel referred to in a 3 January 1986 letter to CNO Adm James D. Watkins is one unclassified example. In this letter

the CSAF referred to the success of the LBT (KC-10) support for naval operations in the Indian Ocean as a basis to suggest the new MOU of 1988.[18]

	FY 1980	*FY 1981*	*FY 1982*	*FY 1983*	
USN	221	344	192	231	
USMC	13	11	75	92	
Total	**234**	**355**	**267**	**323**	
	FY 1984	*FY 1985*	*FY 1986*	*FY 1987*	*FY 1988*
USN	328	452	499	545	749
USMC	348	289	343	325	399
Total	**676**	**741**	**842**	**870**	**1,148**

Source: Headquarters Strategic Air Command, Scheduling and Analysis Division (DONA).

Figure 9. SAC Tanker Sorties Utilized for Navy/Marine Receivers.

Problem Areas

Unfortunately, more often than not, nonscheduled LBT support remains a problem as it has been planned on an ad hoc basis. Therefore, during a crisis situation the planners are not aware, or do not use, the experience gained from a joint exercise or past operational use. This tendency occurs due to short suspense requirements, personnel turnover, and most often the lack of a written concept of operations that has been formulated by both services. In fact, no such joint concept has ever been written. Until one is written, we are destined to repeat the lessons of past experiences. The challenge therefore exists and is included as "attachment 10" of the MOU of 1988. Once written and agreed upon, new combat capabilities and alternatives for the use of joint air power can be exploited, which in effect will create a new form of US strategy and doctrine. This will enhance the capability to achieve national security objectives. Accordingly, we must formalize a linkage between inherent naval capabilities and Air Force land-based tanker support. This linkage will occur when both services publish and use a joint concept of operations which allows for Air Force air refueling support for naval carrier battle groups.

Notes

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18. Gen Charles A. Gabriel, chief of staff US Air Force, letter, subject: Air Refueling Support for Naval Assets, 3 January 1986.

Chapter 3

A Joint Air Refueling Publication is Required

The proliferation of receiver-capable aircraft has led to the creation of the Air Force tanker fleet that now consists of 638 KC-135s and 59 KC-10s. Both types are capable of refueling either Navy or Marine Corps aircraft. Since 1981 the evolution in air refueling capability has begun to transcend traditional service lines and has paved the way toward an increased utilization of the tanker asset. The memorandums of understanding between the Department of the Navy and the Department of the Air Force support and encourage joint use, which is supported by both the Congress and the Defense Resources Board (DRB).

Although the MOUs ensure proper management of joint operation at the staff level, they do not, and cannot, provide operational guidance for the planners and operators. Accordingly, the operators within each service should review their strategy and develop operational concepts so they can more fully utilize the available tanker fleet. They also should begin to plan for the multipoint KC-10 modification and begin to devise new defensive and offensive Navy strike options. In addition, they should recognize potential problem areas and begin to employ Air Force tanker and naval aircraft fully to further enhance naval aircraft operational range. In essence, both services need to go beyond the staff agreements and create an infrastructure that includes the operators. To accomplish this both services need to formalize a joint service publication that can guide the operation of Air Force air refueling support of Navy air operations on a more routine basis.

Once drafted and coordinated, the joint publication needs to be issued within each service and aimed at the naval air operator. It would then provide a foundation from which decisions can be made about the proper use of Air Force tanker support for naval air operations. Its purpose would be to allow the operator to decide if land-based tanker support would help to achieve or to increase the probability of success of a specific tasking or operation. If the answer is yes, then the publication would illustrate the how, who, when, and where the naval commander would obtain Air Force land-based tankers. The publication is needed immediately. During peacetime crisis situations, land-based tankers (LBT) do not normally operate in conjunction with carrier battle groups. The only interface between Air Force and Navy tankers occurs during limited preplanned

aircraft movements or exercises. Accordingly, both services need to ensure a joint operational concept is constructed so the operators can respond to crisis situations worldwide. The publication would also allow the national command authorities (NCA) and the Joint Chiefs of Staff (JCS) to make decisions toward achievement of specific objectives based on real operational capabilities. Additionally, the new publication would create an infrastructure wherein deployed naval operational personnel can have immediate access to Air Force land-based tankers. This access would provide several defensive/offensive advantages not enjoyed to date. Of significant importance would be the added capability to strike targets that were previously out of range, operate the carrier battle group out of threat areas while still covering the target area, and lastly, strike targets while steaming to or away from the crisis area. This new capability not only will expand our national strategy but will also enhance our capability to achieve national security objectives.

Maritime Strategy Includes Use of Land-Based Tankers

The Navy made public its requirement for enhanced tanker operations when it requested its own fleet of land-based tankers in the fiscal year 1987 program objective memorandum. Although the request was denied, it legitimized the requirement for additional refueling assets. As a result sister-service assets (i.e., Air Force land-based tankers) are now included within maritime strategy. Proof of this is illustrated by reviewing what past and present naval officials have recently said about the use of land-based tankers and naval maritime strategy in general.

Most recently, VAdm Robert F. Dunn, assistant chief of naval operations, air warfare, made this statement when asked about land-based tankers:

> My opinion is that the Navy has no business in a land-based tanker role. We have the United States Air Force that has almost 800 tankers and when we have a need for tankers, let's call on the United States Air Force to provide them.[1]

Other senior members within the Navy also recognized the need to use sister-service assets and have stated so when explaining maritime strategy. In fact, Adm James D. Watkins, chief of naval operations, wrote the following when explaining maritime strategy:

> The goal of the overall Maritime Strategy is to use maritime power, in combination with the efforts of our sister services, . . . to bring about war termination on favorable terms.[2]

To accomplish this combination of effort Admiral Watkins specifically mentioned the importance of Air Force/Navy cooperation and the signing of the memorandums of understanding. He stated that the memorandums have helped to accelerate joint efforts and the formulation of joint doctrine—

part of which includes naval aerial refueling requirements in coordination with the Air Force.[3]

Additionally, as mentioned in chapter 2, the use of Air Force land-based tankers by the Navy got both congressional direction and, subsequently, Defense Resource Board direction. On the congressional side, in 1986 the Armed Services Committee "directed that the Navy not procure its own small fleet of tankers, and instead should cooperate with the Air Force which has a large fleet of tanker aircraft."[4] This congressional directive, without a doubt, stipulated that land-based tankers are included and utilized within US naval strategy.

The Defense Resource Board in July 1986, as a follow-up to the congressional direction, further ensured that land-based tankers were to be included as part of US naval strategy when it directed a modification of the KC-10s so they could support the Navy. At that time the Air Force was directed to modify all 60 KC-10 aircraft to accommodate wing-tip refueling pods.[5] These wing-tip pods include the hose-drogue configuration that was created specifically for Navy and allied probe-equipped receivers. The modification was subsequently reduced to 20 aircraft and 15 sets of pods that were to be installed by the end of fiscal year 1989. The reduction is a result of budget constraints and does not signify a change of intent.[6] In effect, both actions taken by Congress and the DRB ensure Air Force tankers will be included in naval strategy; they also reinforce the SAC single manager concept for the tanker fleet.

Strategic Air Command's Single Manager System and Naval Requirements

One of several problems associated with the Navy use of Air Force and land-based tankers is buried within the history of each service. For years each service operated independently. The Air Force provided refueling support for itself and was not in the business of seeking new customers. The Navy, on the other hand, did not seek large tankers; they had developed their own "buddy" tanker fleet. As a result, little or no cross-utilization took place. Because of this each service had its own thought processes and procedures developed for tanker scheduling, training, forecasting, and cost accounting.

Accordingly, when the naval operators thought of refueling, they thought of the buddy concept because no infrastructure was in place to incorporate naval requirements into Air Force programs. Due to the evolution of Air Force/Navy MOUs and direction from Congress stipulating that DOD use its resources more efficiently, refueling thoughts must change to include land-based tankers as well.[7] This, in part, is an educational problem and should be worked on by each service. However, the most influential impact will occur as more and more naval operators use the single management system and refuel from Air Force tankers. The single manager system is

specifically aimed at putting a SAC tanker when and where the receiver wants it, without regard to receptacle configuration. For this to happen as stated in chapter 2, the user (i.e., the Navy receiver unit) must identify the air refueling requirement to Headquarters SAC.

In times of war, contingency operations, or an unplanned crisis response, the Navy's request is made through the JCS as stated in the MOU and AFR 55–47 *Air Refueling Management (KC-10 and KC-135).* During peacetime, all training and exercise requests are made through reference to AFR 55–47. Once SAC obtains a receiver request, it then tasks a tanker unit (a KC-135 or a KC-10) to support the requirement. To fulfill the requirement, SAC has 31 air refueling squadrons located throughout CONUS and two overseas. Additionally, the Strategic Air Command has tanker assets forward deployed at several other overseas bases.[8] The purpose of these tanker assets is to respond to air refueling requests in their theater of operation. In fiscal year 1989, either the KC-135 or the KC-10 or both were located at the following overseas bases:

- Andersen AFB, Guam
- Eielson AFB, Alaska
- RAF Fairford, United Kingdom
- RAF Mildenhall, United Kingdom
- Zaragoza AB, Spain
- Riyadh, Saudi Arabia
- Reykjavik, Iceland
- Kadena AB, Japan

The overseas bases not only provide a friendly base of operation, but they also provide an immediate response capability for air refueling receiver needs worldwide. Other bases can also be used as tanker task force locations, but these are not manned on a continuous basis. Examples could include Clark AB, Philippines, and the island of Diego Garcia, to mention only two.

Inherent within both the KC-135 and the KC-10 technical manuals are the flight crew air refueling procedures that are applicable to all approved (Navy) receiver aircraft. These procedures spell out the altitudes, airspeeds, and communications equipment necessary for each aircraft to rendezvous and to accomplish air refueling successfully. The naval crew force manual is similar and carries the title *Navtops Air Refueling Manual.* Therefore, the single management system, tanker basing, and technical manuals exist and comprise the individual segments of a joint air refueling system.

The problem is that jointness has been agreed upon at the staff level but has not been formalized at the operational level. To overcome this shortcoming the services need to reorganize their thought process on the utilization of tankers. One program designed to do this specific task now exists and is entitled *Business Effort.* Information on this program is published separately as SAC Operations Order 16-85. The single managers at SAC operate this program, which basically allows SAC tanker crews to

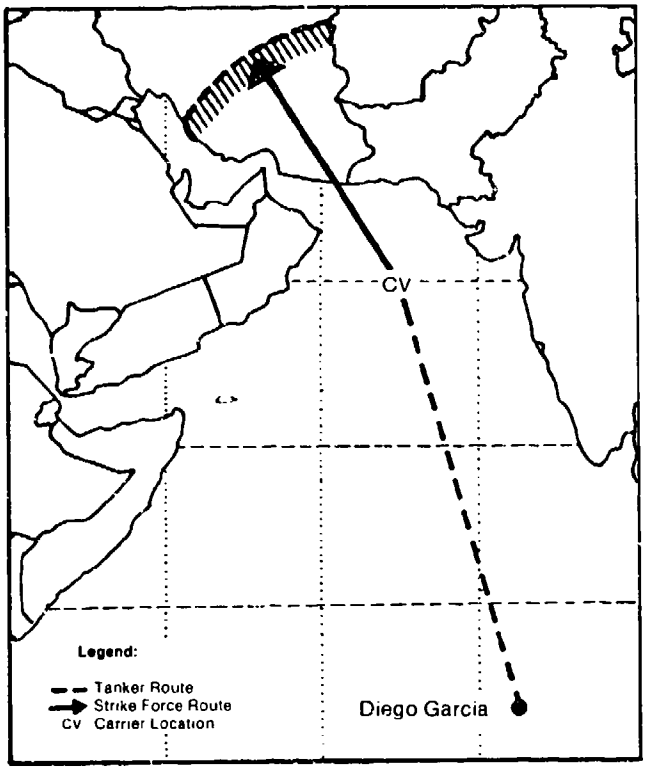
take aircraft (KC-135s/KC-10s) to non-SAC bases (i.e., a Navy base) and to operate them out of Navy locations for a period of time. This program provides benefits to all concerned, since the mission is to give receiver agencies intensive air refueling training. The driving factors include a need for heavy offloads, changing air refueling requirements, and extended loiter time. *Business Effort* provides for joint orientation briefings, orientation flights, and critiques. It also provides receiver force orientation to air refueling techniques and procedures as well as tanker crew training in receiver procedures. The program is provided especially for receiver forces that require such exposure for initial training, replacement training, or qualification training, or when such training would provide a substantial benefit to the receiver unit.[9] The main advantage of such a program is that it allows for hands-on joint use and promotes face-to-face human understanding of how and why each service operates. Additionally, it promotes the train-as-we-plan-to-fight concept. Therefore, if each service begins to use this program and publishes a document to support the operational procedures, naval aviators will gain several offensive and defensive advantages.

This improved naval capability then will provide the national command authorities with new alternatives during times of crisis, as proper use of land-based tankers can ensure sufficient fuel is available when and where naval aircraft need these tankers.

Land-Based Tankers Can Increase Naval Capabilities

In general all tanker aircraft, upon providing fuel to a receiver, provide the receiver the capability for increased range, greater payload (bombs or cargo), and increased loiter time in the target area. Other advantages can also be attained by using tankers. They include the possibility for using the offensive, the element of surprise, and a more economical use of force. Additionally, proper use of tankers—specifically land-based tankers, such as KC-135s and KC-10s—can provide numerous advantages and enhancements to naval air wing operations. This is especially true for crisis control response during low-intensity conflicts. In these types of conflicts, the tankers can specifically provide three offensive strike options for the carrier battle group (CVBG). The options are scenario dependent but provide several possibilities.

1. **Deep Strike.** Land-based tankers give the capability for the CVBG air wing to strike land or sea targets at a substantially increased range. The tankers could rendezvous with the CVBG aircraft, fly hours/miles away, refuel the receivers, and either return to a landing base or await the returning strike force and escort them to the carrier. Figure 10 is used to illustrate such a scenario.[10]



Source: Douglas Aircraft Company Briefing Material.

Figure 10. Deep-Strike Mission.

2. **Strike while Steaming.** This alternative allows the carrier battle group flexible options not used to date. The scenario would involve a land-based tanker force rendezvousing with the CVBG while it is moving to, or away from, a crisis area. Traditionally, a CVBG covers approximately 500 miles per day, thereby limiting its capability to respond rapidly to a distant area of conflict. However, by incorporating the use of LBTs the Navy and Air Force, under direction of the national command authorities, could put together a strike force capable of moving at 500 miles per hour and hitting targets that are geographically out of Navy range for days. This provides for a faster deterrence response to conflicts and certainly presents the element of surprise as well as keeping the CVBG in an undetected, nontargetable, nonthreat environment. (See figure 11.)

3. **Standoff.** This option allows the CVBG to remain over the horizon and out of targetable range from known threats yet be able to strike targets not available without the use of large, land-based tankers. Another advantage is that it allows the CVBG to remain on a middle-to-low alert posture, thereby reducing tension and strain on naval crew members that otherwise would be subjected to a 24-hour prime alert status, as shown in figure 12. A recent case in point was the USS *J.F. Kennedy*. During its

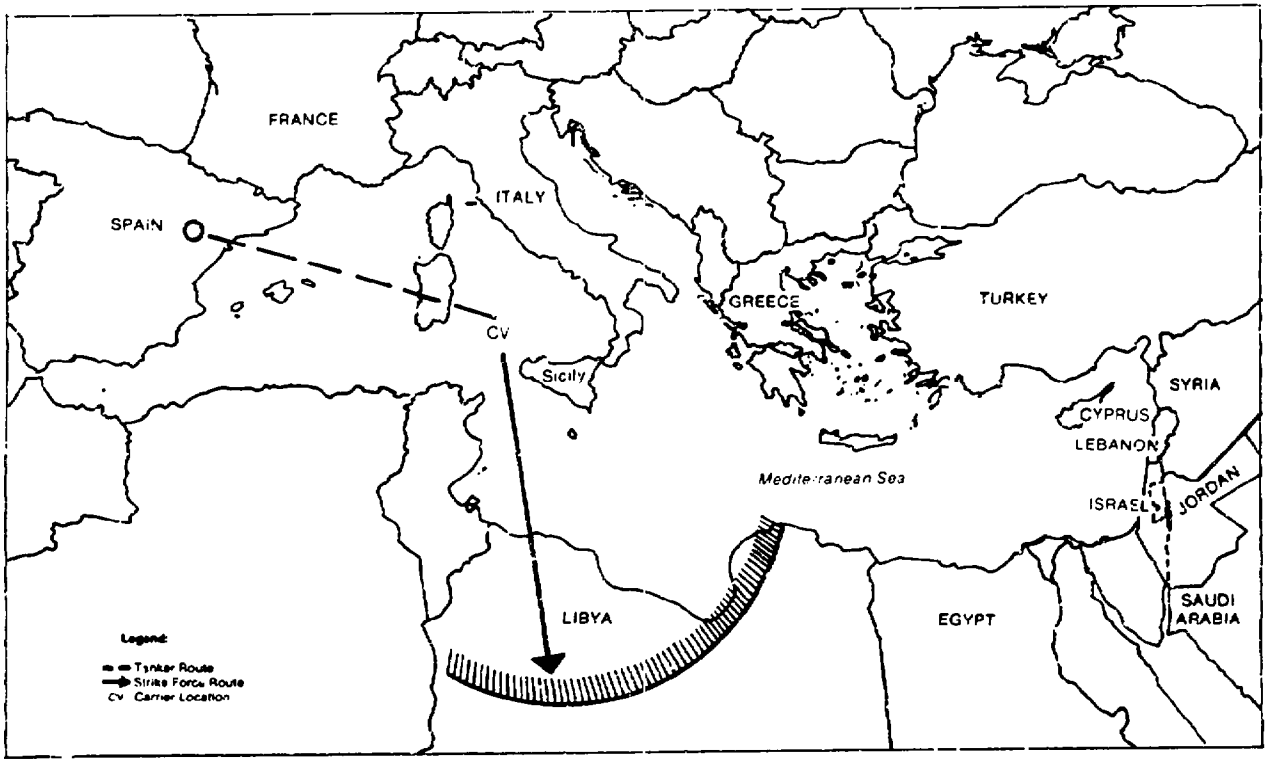


Figure 11. Standoff.

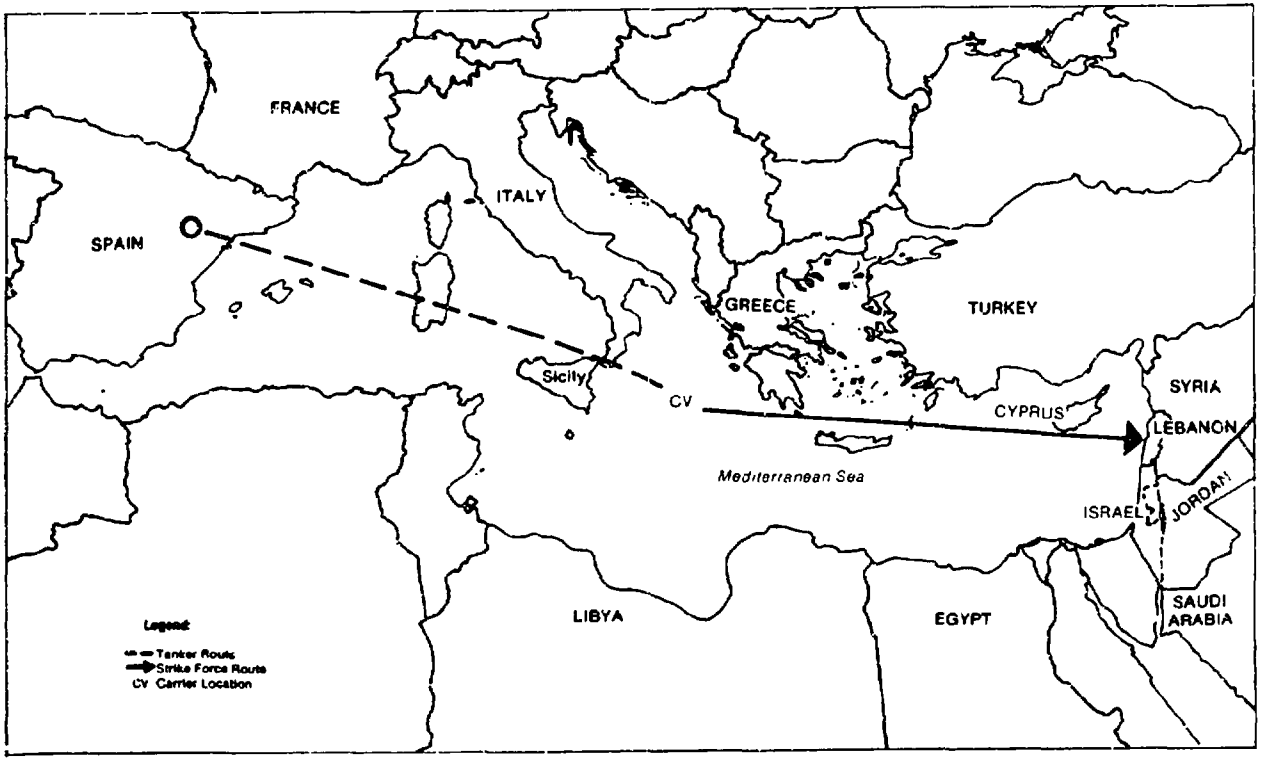
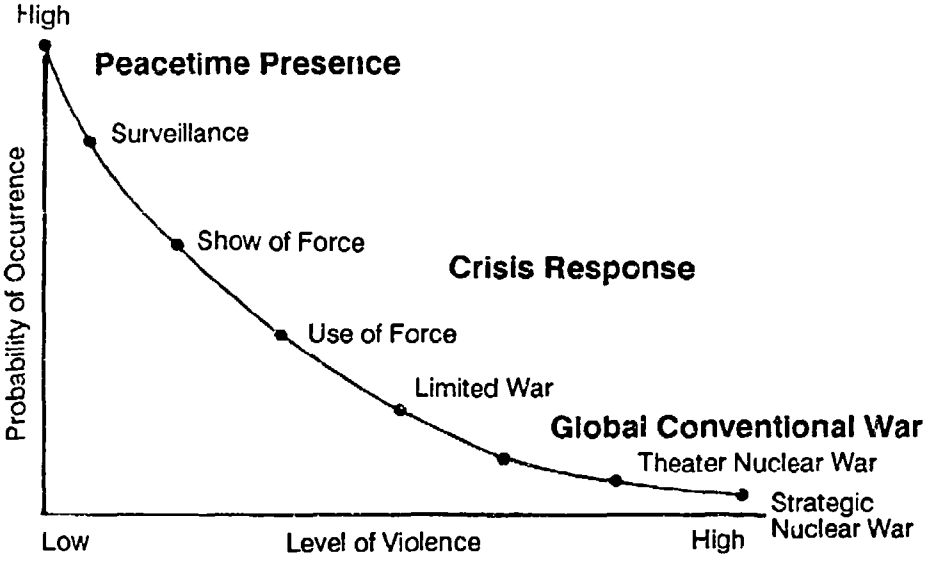


Figure 12. Strike while Steaming.

deployment off the coast of Syria in late 1983, it remained on an alert status for several days.[11] There are some negative trade-offs associated with an extended standoff mission that include sortie regeneration and rescue ability.

The scenarios in the options above are most usable, and their chance of success is most probable, when utilized in the mid-to-low spectrum of war. The author uses figure 13 to illustrate how important these options may be when compared to recent US history. According to Admiral Watkins, the heart of our maritime strategy is crisis response. He believes that our capability to contain, or to control, a crisis is an important factor in the ability to deter a larger scale war. This belief is supported by the fact that the US Navy or Marine Corps has been involved in about 80 percent of the 250 instances of American military employment between 1946 and 1982.[12] Accordingly, we need to enhance our operational capabilities in the most probable use of military force; that is, crisis response.



Source: Adm James D. Watkins, "The Maritime Strategy," US Naval Institute *Proceedings*, January 1986, 8.

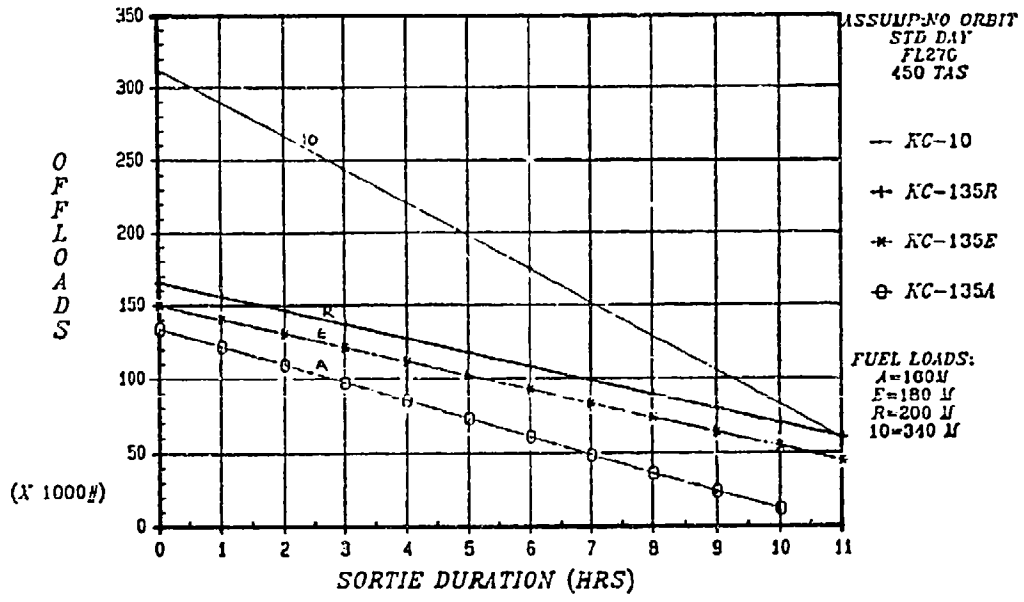
Figure 13. Spectrum of Conflict.

Additional Land-Based Tanker Enhancements

The information listed below in sections 1 through 15 highlights additional land-based tanker capabilities that can be utilized during a crisis or a low-intensity conflict. These examples accent the use of the KC-10, as it is the most capable tanker aircraft and the one suggested for use for the

Navy by past Air Force Chief of Staff Gen Charles Gabriel. Ho ever, either the KC-10 or KC-135 can provide a variation of options depe ding on the scenario. In general, land-based tankers can:

1. Provide more fuel to receiver aircraft than the traditional buddy system. The information in figure 14 illustrates the notional off-load capability of SAC's tanker fleet. For example, on a six-hour sortie (fly for three hours to the rendezvous area, off-load fuel, and then fly three hours back) the KC-10 can provide 170,000 pounds of fuel, the KC-135R 110,000 pounds, the KC-135E 90,000 pounds, and the KC-135A, 60,000 pounds.[13]

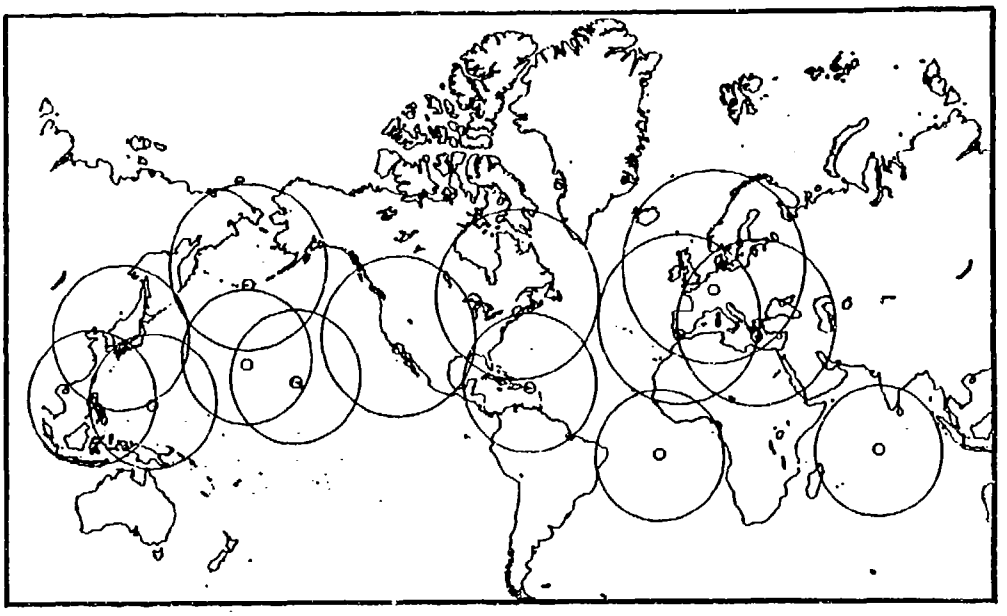


Source: Headquarters SAC, Air Vehicle Division (XRHV), February 1987.

Figure 14. Tanker Off-load Comparison.

2. Refuel a combined joint (Air Force/Navy) or (Air Force/Navy/Marine Corps) task force from either the KC-135 A/R/E aircraft or the KC-10 aircraft. The KC-135 can provide either boom or hose-drogue refueling upon tasking. The KC-10 is dual equipped and can refuel either type during the same sortie. Once the wing-tip modification is complete, the KC-10 will have the capability to refuel more than one probe-equipped aircraft at a time.

3. Respond worldwide within hours to a crisis situation in which fuel is required. Figure 15 shows the capability of the KC-10 to respond to fleet operations providing at least 190,000 pounds of JP-5 fuel within the circled area.[14]



Note: KC-10 tanker with wing-tip pods, 190,000-lb minimum off-load, and JP-5 availability.
Source: Douglas Aircraft Company Briefing Material.

Figure 15. KC-10 Tanker Long-Range Capability in Support of Worldwide Fleet Operations.

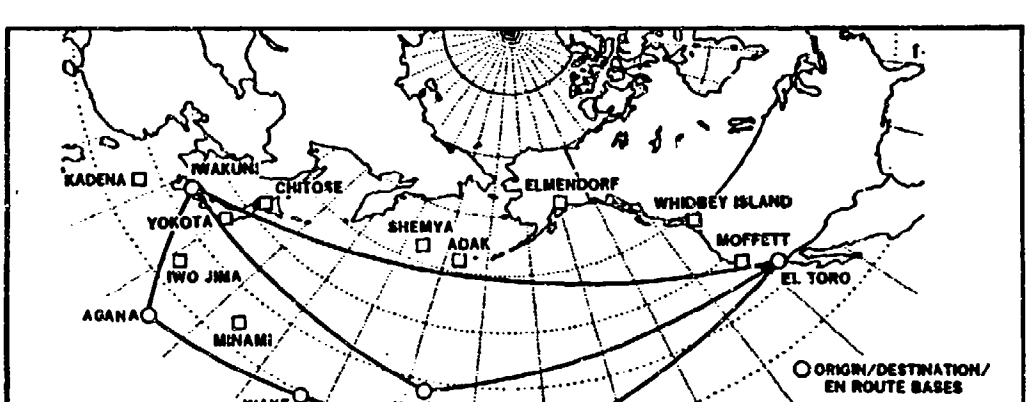
4. Provide for personnel and cargo movement in conjunction with aircraft deployments. Figure 16 compares the capability of the Air Force's KC-10 to the Marine Corps' KC-130 as they move six F-4s from El Toro Marine Corps Air Station (MCAS), California, to Iwakuni MCAS, Japan. Figure 17 illustrates KC-10 support of eight F-14s in the Mediterranean Sea, and figure 18 shows the capability of the KC-10 to deploy F-18s to the Arabian Sea from Cubi Point.[15]

5. Provide for options as to number of personnel or cargo to be moved. The KC-10 can carry either 75 passengers with 17 (463L) pallets or 20 passengers with a 23-pallet configuration or 27 pallets with 170,000 pounds of cargo.[16]

6. Provide airborne pathfinder, command and control, and a multicommunications capability for either rendezvous or voice linkage to surface forces to include an ultra high frequency satellite communications system that is installed on the KC-10.[17]

7. Provide for an undetected, unexpected, over-the-horizon surprise strike force capability, as shown in figure 19.

8. Enhance the margins of safety for foul-weather deck closures or other deck emergencies.[18]



TANKER TYPE	NUMBER OF STOPS	NUMBER OF SUPPORT AIRCRAFT			NUMBER OF FIGHTERS DEPLOYED	CARGO DELIVERED (1,000 LB)	FIGHTER DEPLOYMENT TIME (HR)*
		TANKERS	PATHFINDER	CARGO			
KC-130	3	20	1 C-9B	1 C-130	6	30	53.5
KC-10							
SAME ROUTE ONE STOP	3	1	0	0	6	140	53.5
NO CARGO	1	1	0	0	6	0	27.3
CARGO	1	2	0	0	10	102	27.3
NONSTOP	0	2	0	0	6	26	12.3

*12-HOUR RON AT EACH STOP

Source: Douglas Aircraft Company Briefing Material.

Figure 16. USMC F-4 Deployment—El Toro MCAS, California, to Iwakuni MCAS, Japan.

9. Release Navy buddy attack aircraft from an air refueling role to their primary mission of attack.

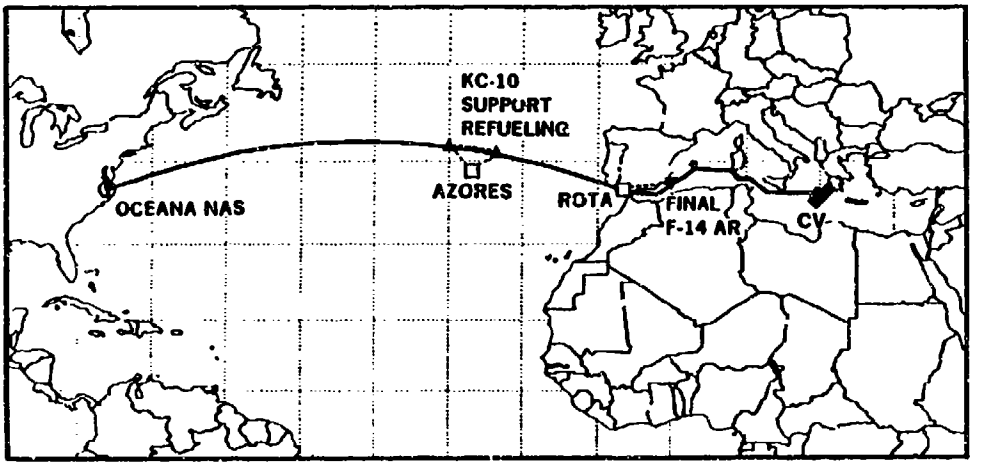
10. Enhance AV8-B VSTOL aircraft capabilities and operational ranges for the Marine Corps.

11. Provide for the possibility to off-load JP-5 fuel from KC-10 aircraft to enhance carrier deck operations.

12. Provide for the decrease of "on tanker time" as the KC-10 wing-tip modification is completed. At the same time provide for more fuel available at a faster flow rate with surge protection and automatic tensioning. The wing-tip modification also allows for more than one airplane to refuel at a time and provides for an increase in tanker off-load reliability, as three hose reels provide redundancy over just one.

13. Be used in coordination with carrier-launched buddy tankers, thereby providing the capability for maximum refueling operations.

14. Provide for a longer combat air patrol (CAP). LBTs can increase CAP range, endurance, and engagement windows. When totaled together, these enhancements help to decrease carrier battle group vulnerability.[19]



Note: Eight F-14s deployed, 29,000-lb cargo delivered to Rota for transshipment to CV, 11-hour deployment time, 4,700 NM.

Source: Douglas Aircraft Company Briefing Material.

Figure 17. F-14 Deployment to Aircraft Carrier in Mid-Mediterranean.

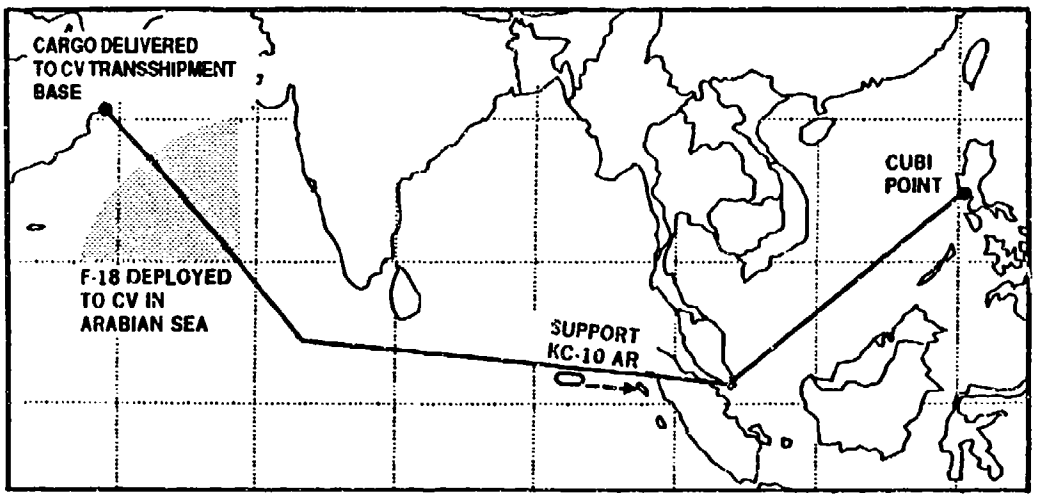
15. Add to carrier battle group defense in depth by providing additional fuel to CAP aircraft.

As the preceding list illustrates, several advantages can be gained by naval use of land-based tankers. However, along with the above enhancements, there are some areas of concern.

Enhancements Are Not without Concern

The following list reveals the issues, or areas of concern, that operators from both services need to address. Although other items may be at issue (e.g., AFR 55-47 interface), this section deals only with items that need to be overcome so the tanker is able to arrive at the proper place at the proper time with the proper amount of fuel to ensure operational mission success. Chapter 5 covers the other areas of possible concern.

Tanker Availability. The availability of Air Force tankers is of continuous concern to naval operators. The solution and answer to this problem lie within the hands of the Joint Chiefs of Staff and continued SAC-Navy cooperation. During normal peacetime training (AFR 55–47 categories A and B sorties), the Air Force and the Navy can and should work internally on any changing requirements. Both services have done this for nearly a decade, and future categories A and B activities represent little change in thought. The problem arises during category C, short-notice contingency operations. Naval operators have a legitimate concern when they ask, "Will the land-based tankers be there when we need them?" Two actions are needed to solve this problem: first, an increase in joint exercises



CASE	F/A-18 DEPLOYED	PAYLOAD DELIVERED (1,000 LB)	MISSION TIME (HR)
1 MISSION KC-10 UNREFUELED	4	46	9.5
1 MISSION KC-10 REFUELED BY 1 SUPPORT KC-10	8	125	9.5

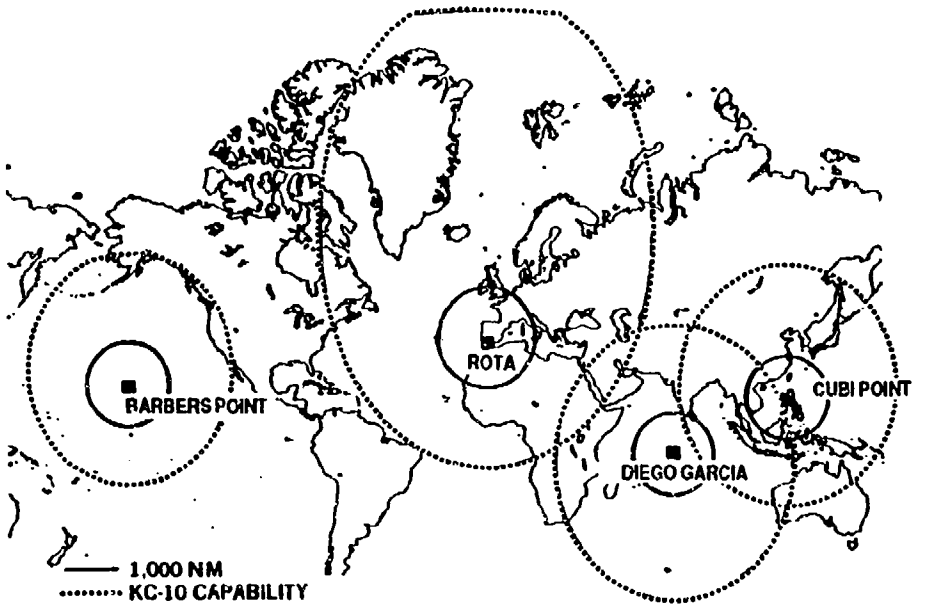
Note: F-18 deployment to aircraft carrier in Arabian Sea with 4,400 air nautical miles and 90 percent worst wind.

Source: Douglas Aircraft Company Briefing Material.

Figure 18. F-18 Deployment to Aircraft Carrier in Arabian Sea.

and more frequent training activity will improve coordination and instill confidence and trust in the joint system. History demonstrates that tanker support is reliable when it is properly coordinated. An example is the 1985 Indian Ocean exercise referred to by Gen Charles A. Gabriel in his 3 January 1986 letter to Admiral Watkins.[20] Another example is the tanker support provided to Navy aircraft during the 1988 Persian Gulf conflict, nicknamed Praying Mantis. This real-world crisis control response was directed by a Navy Joint Task Force and included SAC tankers. During 18–22 April 1988 SAC KC-10s off-loaded approximately three million pounds of jet fuel to 256 receiver aircraft composed of Navy A-4s, A-6s, A-7s, KA-7s, and EA-6Bs from the carrier USS *Enterprise*.[21] Therefore, a simple increase in joint training/operations helps to overcome the problem. Second, however, more work needs to be done, and it should be in the form of a guarantee.

Once a naval request has been received and approved by JCS for land-based tankers that fall into the AFR 55–47 category C area, SAC should release the appropriate number of tankers for naval support for a specific period of time. The Navy can utilize the tanker force as necessary to meet its operational requirements. As a protective measure to SAC and the Navy,



Note: KC-10 radius capability with 2-hour loiter, 90,000-lb off-load; tropical day (90° F) takeoff and reserves of 1/2-hour hold at sea level and +5 percent fuel flow conservatism.

Source: Douglas Aircraft Company Briefing Material.

Figure 19. KC-10 Radius Capability.

SAC could recall the force only upon going to a higher alert status (DEFCON 3), such as when coordinated through the JCS (the JCS will call on SAC). This action complies with the intent of the MOU of 1988, as described within its attachment 8 and guarantees land-based tanker support for naval use during low-intensity conflict situations.

Control of the Tankers. Command and control of the land-based tankers must be in accordance with the current memorandum of understanding. Attachment 8 of the MOU of 1988 specifically states CINCSAC retains operational control, while tactical control is to be executed by the carrier battle group commander. This allows SAC to provide the proper number, mix, and logistical support of the tankers while the Navy determines tactical timing, rendezvous location, amount of fuel, and loiter time.

Land-Based Tankers May Reveal Carrier Location. The Navy is concerned that the use of land-based tankers can lead a potential enemy to the carrier battle group. This, in turn, allows an enemy to target the CVBG. Although this is a possibility, the Navy can take steps to ensure that it doesn't happen. For example, tankers can rendezvous hundreds of miles away from the CVBG, the CVBG can rendezvous with the tankers and then move away in any direction, or a combination of Air Force tankers and Navy buddy tankers can be employed to enhance deception and defense in depth.

It might be pointed out that using land-based tankers in an over-the-horizon strike force in a low-intensity conflict decreases the possibility for detection and targeting by less than a superpower nation.

Land-Based Tankers Do Not Provide JP-5. The standard jet aviation fuel for naval operation is JP-5. Standard jet fuel for US Air Force operation is JP-4. The main difference is the flash point between the two fuels. The problem that naval operators have is that after refueling from an Air Force tanker and receiving JP-4 their tanks must be flushed of any remaining JP-4 fuel to prevent the contamination of JP-5 and to prevent a fire hazard. Since this procedure wastes carrier deck time, naval personnel want the Air Force to provide carrier aircraft with JP-5 fuel.

The KC-10 has the capability internally to isolate JP-5 fuel for off-load to naval receiver aircraft. The KC-10 can also burn JP-5 fuel as an alternate. The problem SAC has with complying with the Navy's request is complex. Not all the bases from which the tankers are required to operate have JP-5 fuel, and the time or distance required for the tankers to get JP-5 makes that solution unacceptable. Since SAC tasks tankers worldwide, depending on timeliness and availability, the KC-135s may have to be used to support the Navy. This aircraft does not have a fuel isolation capability, but it too may use JP-5 as an alternate fuel. Therefore, the solution to this problem lies within coordination, coupled with fuel and aircraft availability. The SAC single manager system should attempt to provide both the KC-10 aircraft and JP-5 fuel when feasible. At the same time, the Navy must be willing to resolve the problem within the operational constraints of the scenario. Attachment 1 of the MOU of 1988 addresses this problem.

The Navy Needs to Train as It Will Fight. Current maritime strategy calls for a forward defense and for the Navy to train as it will fight. Additionally, past history, when coupled with the probability of conflict at the lower spectrum of war, suggests that the Navy will most likely continue as the instrument of power chosen by the president to respond to a crisis. To be able to respond, naval strategy should include all facets of military power available. Accordingly, use of land-based tankers increases the options available not only to naval planners but also to US planners, and ultimately it provides alternatives for use of power by the NCA.

To be ready to respond to NCA taskings, both services need to increase their joint activity and begin to train to the limit of the assets available. The first step involves using the *Business Effort* program prior to each carrier battle group deployment. This should involve Navy familiarization training behind both the KC-135 and the KC-10. In addition, when the carrier battle group is near one of the tanker's overseas bases it should plan and periodically practice a joint rendezvous and refueling exercise. The factors already mentioned will improve confidence, exercise the system, and ensure that training prepares participants for possible NCA taskings.

As already discussed operational issues need to be overcome. However, each issue has a solution and should not in itself serve to deny increased

joint use. The recently signed MOU of 16 November 1988 presents the foundation at the staff level for the operators to build on. What is now required is an operational concept that allows for joint use at the planner, air wing, and squadron level. Appendix A is an initial attempt at drafting such a document. However, its success may depend on putting into action some of the recommendations below.

Recommendations

To facilitate the implementation of a multiservice operational concept, several actions need to be taken. Either individually or as a whole, these recommendations help to integrate the US tanker asset with naval receivers. SAC and or the Navy and Marine Corps should consider the following:

1. AFR 55–47 should be rewritten as a multiservice or joint service publication. As a minimum, it should be made available to each operational level of users within the Navy and Marine Corps (i.e., air wing) to allow joint input, use, and distribution down through the squadron and air wing levels. This will enhance the infrastructure and help to change the thought process for use of air refueling.

2. SAC should invite naval air wing and Marine Corps personnel to the headquarters and educate them in the process of determining requirements, forecasting exercises, funding, and the procedures necessary to obtain land-based tanker support. The purpose of such training is to provide a working relationship and understanding of the Air Force air refueling capabilities and the coordination required.

3. Both Navy and Marine air wing personnel should develop liaisons with officers attached to the Strategic Air Command and then publish a roster for coordination purposes. This procedure will help to humanize the jointness concept and provide for a knowledge base of experience.

4. SAC should adopt the policy of assigning a naval exchange pilot to each of its KC-10 squadrons equipped with the new wing-tip hose-reel modification. This process will provide continuous interface within each service at the operational level until the new procedures have matured.

5. The Navy and Marine Corps funding should be programmed into the POM or identified internally for the LBT air refueling training that is expected on an annual basis. This will ensure that Navy/Marine Corps plans are reviewed and that the funding is provided to complete the joint concept. Available funds will preclude cancellations or nonuse based on the lack of planning. Headquarters USAF/XOOTS, Strategic Division, could facilitate this progress by coordinating with the Department of the Navy's Trainer/Support Aircraft Plans Office (OP-505G) and the Marine Corps' Aviation Plans Programs Doctrine Joint Matters and Budget Branch (code APP Washington, D.C.).

In addition, provisions must be taken to ensure SAC flying hours expended in support of the Navy/Marine Corps are reimbursed to SAC. The Air Force and SAC cannot continue to pick up the bill for all refuelings.

6. SAC should ensure that all three KC-10 bases—March AFB, California; Barksdale AFB, Louisiana; and Seymour Johnson AFB, North Carolina—obtain aircraft with the wing-tip hose-reel modification. Doing so will allow for crew force training fleetwide and will provide planners with optimum use of crew members worldwide (i.e., aircraft changes, cover for duty not involving flying, aircraft systems standardization, and qualification).

7. SAC/Navy/Marine Corps should increase the frequency of joint training to fully utilize the KC-10 that is modified with the wing-tip hose reel to ensure the services comply with congressional and Defense Resource Board direction.

8. SAC and the Navy should develop a "test scenario" whereby SAC assigns a tanker task force to support a CVBG for a period of time while on deployment. The scenario could involve dedicating a small number of tankers from a forward-deployed SAC base and operating out of such a location in support of a moving CVBG. This training should be in preparation for any JCS tasking. The purpose of the training would be to identify areas of strength and areas of concern. Such a test would present a look at the manpower and planning required and the communications difficulties and operational and logistical factors needed to support such a changing requirement. This test in turn would help to refine and provide direction for future operational concepts. However, until some tests are accomplished and feedback is provided, appendix A is a first attempt to create an operational doctrine.

9. Navy CVBGs should ensure LBT air refueling training is accomplished prior to each deployment, using the *Business Effort* program when feasible. This will provide familiarization and ensure the CVBG can utilize LBTs if called upon by the JCS or NCA.

Notes

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APPENDIX A

A Proposed Concept of Operations
between the
Department of the Air Force and
the Department of the Navy
on
Land-Based Tanker
(Air Refueling)
Support for Maritime Operations (Air)

June 1989

Contents

ILLUSTRATIONS

Part I—Abbreviations

AAW	antiair warfare
AAWC	antiair warfare commander
AR	air refueling
ARCP	air refueling control point
ARCT	air refueling control time
AREC	air element coordinator
ARIP	air refueling initial point
ARF	Air Reserve Forces
ASUWC	antisurface warfare commander
ASWC	antisubmarine warfare commander
BAR	begin air refueling
BDA	boom-drogue adapter
C^2	command and control
C^3	command, control, and communications
CAP	combat air patrol
CINCSAC	commander in chief, Strategic Air Command
COMSEC	communications security
C/R	communication/rendezvous
CSAF	chief of staff, Air Force
CSAR	combat search and rescue
CV	aircraft carrier
CVBG	carrier battle group
CWC	composite warfare commander
DF	direction finding
DON	Department of the Navy

DME	distance measuring equipment
DNIF	duty not to include flying
EMCON	emission control
FOB	forward operating base
HQ SAC	Headquarters Strategic Air Command
IAP	instrument approach procedure
ISA	interservice support agreement
J-7	Operational Plans and Interoperability Directorate, Joint Staff
JCS	Joint Chiefs of Staff
JFACC	joint force air component commander
JFC	joint force commander
JMO	joint maritime operations
JTF	joint task force
JTTP	joint tactics, techniques, and procedures
LBT	land-based tanker
LCN	load condition number
LIC	low-intensity conflict
LOC	lines of communications
MOA	Memorandum of Agreement
MOU	memorandum of understanding
NCA	national command authorities
NMCC	National Military Command Center
OCLUS	outside continental limits of United States
OPCOM	Operational Command
OPCON	operational control

OPSEC	operations security
OTC	officer in tactical control
RECCE	reconnaissance
RZ	rendezvous
RZIP	rendezvous initial point
SAC	Strategic Air Command
SAM	surface-to-air missile
SAR/CSAR	search and rescue/combat search and rescue
SEAD	suppression of enemy air defense
SLOC	sea line of communications
STW	strike warfare
SWC	strike warfare commander
TACON	tactical control
TF	task force
TG	task group
TTF	tanker task force
TTFC	tanker task force commander
TTP	tactics, techniques, and procedures

Part II—Definitions

Air refueling (AR)—The refueling of an aircraft inflight by another aircraft.

Air Refueling Airspeed—An airspeed or Mach number at which air refueling will be initiated.

Air Refueling Abort Point—A planned point along the air refueling track at which the receiver or tanker is directed to return to the recovery base in the event that fuel transfer is not successful.

Air Refueling Cell (Tanker/Receiver Cell)—Two or more tankers and/or receivers.

Air Refueling Control Point (ARCP)—The planned geographic point over which the receiver(s) arrive in the observation/precontact position with respect to the assigned tanker.

Air Refueling Control Time (ARCT)—The planned time that the receiver and tanker will arrive over the air refueling control point (ARCP).

Air Refueling Element—One tanker and one or more receivers.

Air Refueling Exit Point (A/R EXIT PT)—The designated geographic point at which the refueling track terminates. In a refueling anchor it is a designated point where tanker and receiver may depart the anchor area after refueling is completed.

Air Refueling Initial Point (ARIP)—A point located upstream from the ARCP where the receiver aircraft initiates a rendezvous with the tanker.

Air Refueling Initial Point (ARIP) (Fighter)—A point located upstream from the ARCP (inbound to ARCP) where the receivers can get a positive fix using the navigational aids available. (Time over ARIP is used to confirm or correct the ETA to the ARCP.)

Air Refueling Rendezvous—The procedures employed to enable the receiver(s) to reach the precontact position behind the assigned tanker(s) by electronic, radio, and/or visual means. The basic types of rendezvous procedures are the Point Parallel, ON-COURSE, and en route. All other rendezvous procedures are modifications on the basic types.

Air Refueling Time—Planned elapsed time from ARCP to completion point.

Air Refueling Track—A track designated for air refueling.

Note: Unless identified as extracted from JCS Pub 1-02, terminology in this glossary is not standardized within the Department of Defense and is applicable only in the context of this document.

Anchor (ED)—Orbit or an orbiting position indicated (position may be any visible object, standard reference point as long as it can be clearly understood).

Anchor Point—A designated geographical point on the downstream end of the inbound course of the Anchor Refueling Pattern.

Anchor Refueling—Air refueling performed as the tankers maintain a prescribed pattern which is anchored to a geographical point or fix.

Anchor Rendezvous—The procedures normally employed by radar (CRC/GCI/AWACS) to vector the tanker(s) and receiver(s) for a visual joinup for refueling.

Base Altitude—A reference altitude at which the lead aircraft of a tanker formation (or single aircraft for individual air refueling) will fly at initial contact.

Beacon Rendezvous—Use of an airborne radar or rendezvous beacon to provide range and offset.

Emission Control (EMCON)—The management of electromagnetic radiations to counter an enemy's capability to detect, identify, or locate friendly emitters for exploitation by hostile action.

Emission Options—Options developed to allow aircrews to rendezvous and air refuel using four levels of emission control. These options are:

Emission Option 1—Any and all emitters are authorized to ensure timely training/feedback and maximum safety; emission 1 is used for initial qualification, requalification, category qualification and difference training for tanker or receiver units.

Emission Option 2 (Restricted Communications)—Radio silent formation except for rendezvous and air refueling conducted with only two radio exchanges. Emission option 2 is the desired sandard for daily air refueling operations. More restrictive procedures under emission option 2 will be fully coordinated between tanker and receiver units. In an actual emergency the tanker/receiver may transmit over air refueling frequency.

Emission Option 3 (Communications Out)—Radio silent operations including formation, rendezvous and refueling. The use of other emitters is authorized unless prohibited by supported operations, plans, etc. Emission option 3 will be directed for exercise and operational sorties only.

Emission Option 4 (Emission Out)—No emitters will be used unless specifically authorized by the plan supported. This includes radios, doppler, radio navigation transmitters, radar, radio altimeters, IFF, exterior lighting, etc. This option will not be practiced during peacetime operations unless specifically tasked by NAF or higher headquarters.

Emission Out—No emitters utilized except as authorized. Doppler navigation systems may be used as required for mission accomplishment.

Emitter—A piece of equipment that emits electromagnetic radiation (radios, radar, TACAN, IFF, Doppler, radio altimeter, etc.).

End Air Refueling (EAR)—A planned point or the actual position within the confines of the air refueling track where all refueling operations/requirements are complete.

En Route Rendezvous—Procedure used when joinup is to be accomplished en route to the refueling area at the RZ by making good a scheduled time. Timing may be accomplished by utilizing an orbit delay or timing triangle.

Hot Armament—Forward firing ordnance that can be selected and fired by the receiver pilot or crew.

Joint Force Air Component Commander (DOD)—The joint force air component commander derives authority from the joint commander, who has the authority to exercise operational control, assign missions, direct coordination among subordinate commanders, redirect and organize forces to ensure unity of effort in the accomplishment of his overall mission. The joint force commander will normally designate a joint force air component commander. The joint force air component commander's responsibilitieswill be assigned by the joint force commander (normally these would include, but not be limited to, planning, coordination, allocation and tasking based on the joint force commander's apportionment decision). Using the joint force commander's guidance and authority, and in coordination with other service component commanders and other assigned or supporting commanders, the joint force air component commander will recommend to the joint force commander apportionment of air sorties to various missions or geographic areas. (JCS Pub 1-02)

Joint Maritime Operations (Air)—The employment of joint force air efforts to achieve military objectives in the maritime environment.

Maritime Environment—The oceans, seas, bays, estuaries, islands, and coastal areas and the airspace above them, including amphibious objective areas.

Maritime Power Projection Operations—Power projection in and from the maritime environment, including a broad spectrum of offensive military operations to destroy enemy forces or logistic support or to prevent enemy forces from approaching within enemy weapons range of friendly forces. Maritime power projection may be accomplished by amphibious assault operations, attack of targets ashore, or support of sea control operations.

Mixed Air Refueling Cell—Two or more tankers refueling two or more dissimilar types of aircraft simultaneously.

Normal Communications—Normal procedures as established in current air refueling technical orders. All rendezvous aids may be utilized as necessary.

Officer in Tactical Command (DOD, NATO)—In maritime usage, the senior officer present eligible to assume command, or the officer to whom he has delegated tactical command. (JCS Pub 1-02)

Off-load/Onload—The amount of fuel transferred between tankers and receivers.

Operational Control (DOD)—The authority delegated to a commander to perform those functions of command over subordinate forces involving the composition of subordinate forces, the assignment of tasks, the designation of objectives, and the authoritative direction necessary to accomplish the mission. Operational control includes directive authority for joint training. Operational control should be exercised through the commanders of assigned normal organizational units or through the commanders of subordinate forces established by the commander exercising operational control. Operational control normally provides full authority to organize forces as the operational commander deems necessary to accomplish assigned missions, and to retain or delegate operational control or tactical control as necessary. Operational control may be limited by function, time, or location. It does not, of itself, include such matters as administration, discipline, international organization, and unit training. Also called OPCON. (JCS Pub 1-02)

Orbit Pattern (Tanker)—The pattern flown by the tanker at the orbit point.

Orbit Point (Tanker)—A geographical point along the planned air refueling track where the tanker will orbit.

Point Parallel Rendezvous Procedures—The procedure normally used when the tanker arrives in the refueling area ahead of the receiver (a tanker orbit is normally planned).

Radio Silence—Air refueling without the aid of verbal instructions.

Receiver Holding Point—A point along the upstream end of the inbound course to the Anchor. Point where the receiver(s) will hold until cleared for rendezvous by the tanker. This point is used during Anchor Refueling Alternate Procedures.

Rendezvous Control Time--A general term that applies to any control time utilized for accomplishing a rendezvous between tanker and receiver at a specific point (i.e., at the ARCP, RZ, RZIP, etc.).

Rendezvous Equipment—Electronic/radio equipment installed in tanker and receivers for use in accomplishing a rendezvous.

Rendezvous Initial Point (RZIP)—A planned geographical point prior to ARCP at which joinup is initiated by starting descent at the scheduled rendezvous control time.

Rendezvous Point—A general term that applies to any planned geographical point where a joinup between two or more airplanes is accomplished (i.e., ARCP, RZIP, RZ, Anchor Point, etc.).

RZ—Identifier for geographic point at which joinup is initiated by starting descent at the scheduled rendezvous control time.

Sea Control Operations (DOD, IADB)—The employment of naval forces, supported by land and air forces, as appropriate, to achieve military objectives in vital sea areas. Such operations include destruction of enemy naval forces, suppression of enemy sea commerce, protection of vital sea lanes, and establishment of local military superiority in areas of naval operations. (JCS Pub 1-02)

Strike Warfare—Naval operations to destroy or neutralize enemy targets ashore, including attack against strategic and tactical targets such as manufacturing facilities and operating bases from which the enemy is capable of conducting or supporting air, surface, or submarine operations against friendly forces.

Tactical Air Control System—This may be any CRC, GCI, or AWACS control system.

Tactical Control (DOD, NATO)—The detailed and usually local direction and control of movements or maneuvers necessary to accomplish missions or tasks assigned. Also called TACON. (JCS Pub 1-02)

Section 1

Introduction

1. **Purpose.** To provide a concept of operations that serves as a guide for planning the employment of US Air Force land-based tanker (LBT) assets in support of Navy and Marine Corps maritime air operations during low-intensity conflicts. The explicit purpose of this document is to enhance the combat effectiveness of such joint Air Force-Navy-Marine operations by providing a reference from which planners and operators can review and devise operations based on proven and accepted concepts formulated from years of experience in such joint activity. It is intended as a user-friendly document, whereby it will facilitate the decision to make use of land-based tankers. In short, it illustrates the how, who, when, and where to obtain US Air Force land-based tanker support. It also lists the different options that can be made available by utilizing land-based tankers and checklists of needed activity to be performed and lessons learned.

2. **Scope.**

a. The joint tactics, techniques, and procedures (JTTPs) presented within this publication apply to the Air Force, Navy, and Marine Corps, and their joint task forces. The general and or individual concepts included in this publication apply to joint force air operations that are conducted to achieve military objectives in the maritime environment as coordinated by the agencies that are involved and as directed by the national command authorities (NCA)–Joint Chiefs of Staff (JCS) or as requested by the Navy and the Marine Corps. This publication is governed by JCS Publication 3-04, *Doctrine for Joint Maritime Operations (Air)*, and Air Force Regulation (AFR) 55-47, *Air Refueling Management (KC-10 and KC-135)*. Users of this publication should recognize that any individual crisis, or low-intensity conflict situation, presents a unique scenario that demands the flexible application of the concepts presented herein. Ideally, readers should use this publication as a guideline so they can achieve a well coordinated, planned, and executed joint operation that effectively utilizes the joint military capabilities for the fulfillment of the objective and goal of the mission. This publication is not intended to be restrictive in nature but seeks to reduce ad hoc planning and to strengthen past weaknesses.

b. This publication is a result of past and present memorandums of agreement (MOAs), memorandums of understanding (MOUs), and interservice support agreements (ISAs) between the Department of the Air Force (DAF) and the Department of the Navy. Any unforeseen conflicts between this publication and the MOUs/ISAs must be worked between the involved agencies and the corresponding MOA, MOU, and ISAs, as applicable. Until such time that an issue is resolved, the current MOU-ISA has precedence. Although this publication is aimed at the planning and employment of the

missions described within AFR 55-47, category C (short-notice, unscheduled, contingency, and limited-war activities), it is also meant to be used for exercises and training, as necessary, as the benefits of such interplay have proven invaluable.

c. When a joint force consists of only elements from the Navy and Marine Corps, this publication does not apply. The above joint force is solely governed by regulations within the Department of the Navy.

3. **Objective.** This concept of operations provides written guidance for use by the operators and planners of the participating services so that they may more fully utilize the air refueling assets available to further enhance maritime airborne combat capabilities during reaction to a crisis or during low-intensity conflicts. In addition, this concept is aimed at achieving or enhancing the joint force efforts as described in JCS Pub 3-04, *Doctrine for Joint Maritime Operations (Air)*, and the intent of joint operations as directed by the Goldwater-Nichols Department of Defense Reorganization Act of 1986.

4. **Terminology.** Definitions listed in the JCS Pub 1-02, *Department of Defense Dictionary of Military and Associated Terms*, apply to this document. A glossary is provided for clarification of pertinent abbreviations and definitions. Additionally, as extracted from JCS Pub 3-04, other general terms used within the document are clarified as discussed below.

a. The commander exercising operational command (OPCOM) or operational control (OPCON) of joint forces in accordance with JCS Pub 0-2, *Unified Action Armed Forces (UNAAF)* (FOUO) (formerly JCS Pub 2), is the joint force commander (JFC). Such forces include unified commands, certain specified commands, subordinate unified commands, and joint task forces composed of significant elements of the Army, Navy, Air Force, and Marine Corps, or of two or more of these services, operating under a single command designated by proper authority.[1]

b. The term *joint maritime operations (air)* refers to the employment of joint force air efforts to achieve military objectives in the maritime environment. JMO (Air) are employed to destroy or reduce to an acceptable level the enemy air, surface, and subsurface threat to friendly forces and to suppress enemy commerce; to gain and maintain local air superiority in the maritime environment to protect vital seas and sea line of communications (SLOC); and to support land-based operations, as directed and guided by the JFC. To enhance the combat effectiveness of the joint force, it may be necessary for JMO (Air) forces to integrate their operations with the uniquely interdependent air, surface, and subsurface operations of naval task forces. Essentially, JMO (Air) will be employed to support two interrelated operations, sea control and power projection.

(1) Sea control is achieved through destruction or neutralization of hostile aircraft, ships, submarines, space-based, and land-based weapon systems that threaten US or friendly forces operating in vital sea areas. Sea control includes:

(a) Direct action to locate and destroy hostile combat units on, over, and under the high seas and shore-based weapon systems that threaten or attack naval or other maritime forces.

(b) Barrier or blockade operations to deny enemy naval forces access to open ocean areas and other maritime areas, taking advantage, where possible, of natural choke points.

(c) Moving screen operations involving the use of joint force assets to clear the seas surrounding friendly ships.

(d) Offensive and defensive mining operations to restrict the freedom of movement of enemy naval forces in areas such as harbors and geographic choke points and mine countermeasures to permit freedom of movement of friendly naval forces.

(2) Maritime power projection in and from the maritime environment includes a broad spectrum of offensive military operations to destroy enemy forces and logistics support and to prevent enemy forces from approaching within enemy weapons range of friendly forces. Maritime power projection is accomplished by:

(a) Amphibious assault operations.
(b) Attack against targets ashore.
(c) Support of sea control operations.[2]

c. The fundamental purpose of JMO (Air) is to enhance the combat effectiveness of the joint force. The effective execution of warfare missions and tasks in the maritime environment requires responsive, centrally controlled but not centrally executed operations. JMO (Air) require forces to operate in an environment hostile to communications. Planning, coordination, and training to support JMO (Air) should emphasize prompt, effective, unified effort with little or no advance notice, and should ensure that the effectiveness of operations is not overly reduced by communications failure or degradation.[3]

Notes

1. JCS Pub 3-04 (Test Pub), *Doctrine for Joint Maritime Operations (Air)*, 1 May 1988, I-2.
2. Ibid., I-2, I-3.
3. Ibid., I-4.

Section 2

Use of A Proposed Concept of Operations

1. **How to Use this Publication.**

This publication is written in a step-by-step format (below) which is followed by explanations to be used in aiding Navy-Marine Corps planners-operators in the coordination procedures that are required in requesting LBT support or utilizing land-based KC-10 or KC-135-type tanker aircraft. The following information must be reviewed as it includes the basic factors to be considered when using LBT support. It is summarized also as a checklist so that it can be used to facilitate tanker-receiver request-planning coordination. A more detailed explanation is provided in other sections of this publication as indicated.

2. **Factors to Consider in Requesting Land-Based Tankers.**

a. **Step one.** Ensure receiver aircraft pilots have been air refueling qualified with US Air Force tankers before carrier battle group (CVBG) deployment. If not, check currency requirements to ensure pilots are qualified.

b. **Step two.** Determine if LBTs are required. After receipt of a tasking, review naval internal capabilities. If the threat, distance, timing requirements, target, or any of the factor limits the probability of mission success, consider use of land-based tankers. If the mission can be accomplished within the capabilities of CVBG air assets, plan accordingly.

c. **Step three.** Review mission options and the various capabilities that can be performed by US Air Force land-based tankers. See chapter 3, paragraph 4, and chapter 4, paragraph 2.

d. **Step four.** Inform appropriate agencies/people as soon as possible to coordinate support from land-based tankers. These include JCS, Headquarters US Air Force, and Headquarters Strategic Air Command (SAC). See chapter 3, paragraph 6 c(1) for sample message format.

e. **Step five.** Review the lessons learned from past joint activity. See chapter 6.

f. **Step six.** After initial contact with Headquarters SAC refine the plan and finalize all required data with Headquarters SAC or assigned tankertask force (TTF) personnel as necessary. Be prepared to coordinate changes and establish go-no-go times and decision points.

g. **Step seven.** Monitor go-no-go, decision points based on factors such as weather, threat, intelligence, etc. Confirm go-no-go at proper times.

h. **Step eight.** Monitor mission, delay, recall, abort, and or reconstitution procedures. Make decisions and coordinate as necessary with all agencies.

i. **Step nine.** Prepare an after-action report based on staff and crew level experiences.

3. **Land-Based Tanker Coordination Checklist.**

a. Are receiver pilots US Air Force A/R qualified?

b. Review taskings—are LBTs desired?

c. Have the mission options and various capabilities of LBTs been reviewed and selected?

d. Have the JCS, Headquarters US Air Force, and Headquarters SAC approved?

e. Has the lessons-learned section been reviewed and acted upon?

f. Has the plan been reviewed and agreed upon by all concerned agencies, with proper timing established?

g. Have go-no-go decision points been coordinated and achieved?

h. Has a mission monitor for possible mission delays, recalls, aborts, or reconstitution procedures been established and coordinated?

i. Has an after-action report been submitted?

4. **Coordination between Services.**

a. Proper planning, supported with accurate and specific air refueling requirements, will help to ensure mission success. However, overall mission success involves a continuous coordinated process and an in-depth review and an alysis of the plan. Additionally, mission execution and the employment phase of the mission demands operational expertise and the ability to make on-the-spot decisions. Accordingly, to accomplish this process each agency or service that is involved within the mission will establish a point of contact. This person and or his or her designated alternate should become familiar with the mission and be capable of making immediate operational or staff-level decisions to ensure the safety of the aircrews and aircraft.

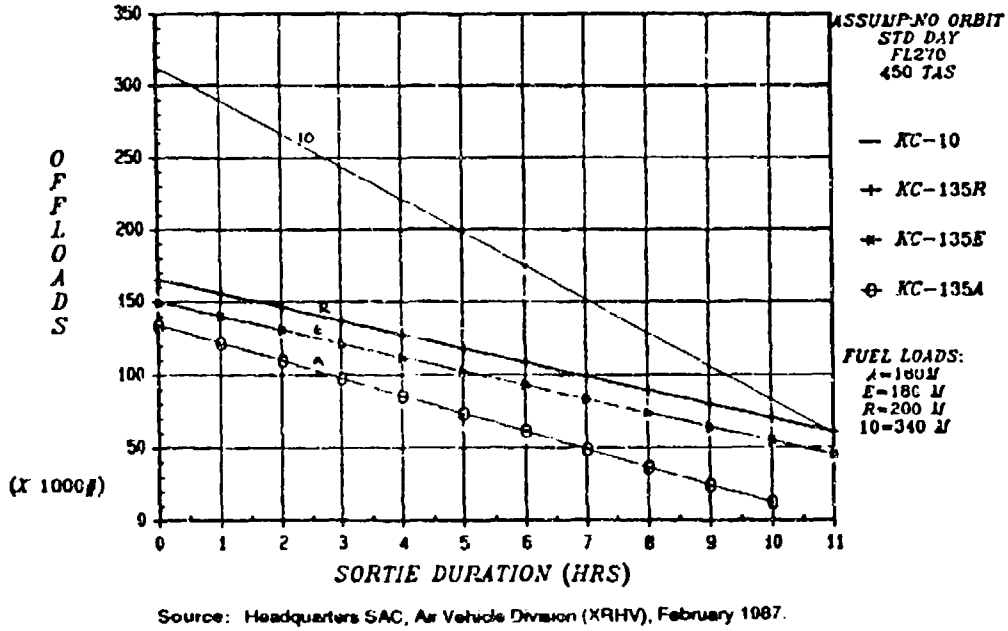
b. Each point of contact with each agency is required to review the mission and plan for executability and coordinate with other agencies as necessary. If the plan is faulty the point of contact should make this known to the proper agencies or higher authority and suggest or devise a workable solution that is achievable within the specific area of responsibility.

Section 3

Planning

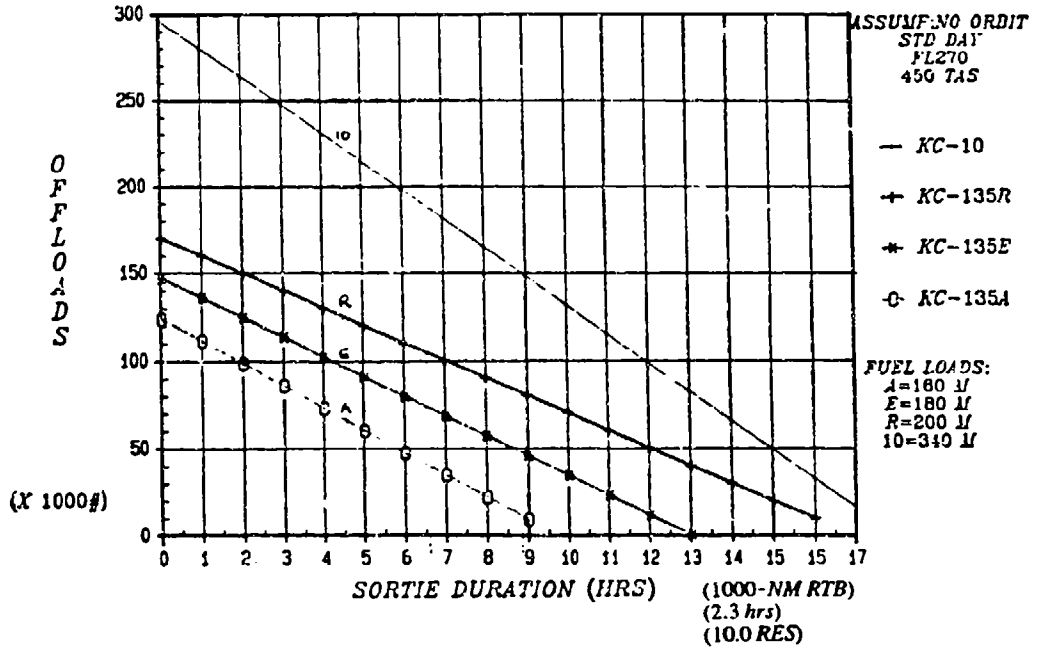
1. **The Decision to Use Land-Based Tankers.** The decision to request, plan for, and utilize US Air Force land-based tankers depends on several factors. In general, upon receipt of a tasking or mission, Navy-Marine Corps personnel review the timing, targeting, threat, fuel requirements, and distance to the mission area. Other factors include combat air patrol requirements, availability of strike aircraft, ordnance, extent of damage desired on the target and search and rescue requirements. After such review, it may be determined that US Air Force land-based tankers can facilitate or enhance the probability of mission success.

2. **The Off-load Capabilities of Land-Based Tankers.** Regardless of location of the CVBG land-based tanker, assets can be made available worldwide given proper warning time. Experience has shown that early requests produce better planning and execution of the mission. As a general rule, figures A-1 and A-2 show the approximate amount of fuel that can be made available (off-loaded) by a single KC-10 or KC-135 A/R/E given the parameters provided. Additional tankers (a cell) may be utilized to provide more fuel, if needed.



Source: Headquarters SAC, Air Vehicle Division (XRHV), February 1987.

Figure A-1. Tanker Off-load Comparison.



Source: Headquarters SAC, Air Vehicle Division (XRHV), February 1987.

Figure A-2. Tanker Off-load Comparison.

a. **Fuel Loads versus Mission.** It must be noted that land-based tanker fuel loads and takeoff gross weight are determined from performance manuals and are totally dependent on available runway length, cargo-passenger loading, and other environmental factors. Therefore, the above charts (figures A-1 and A-2) provide an approximate off-load capability and are provided only for information. Actual fuel loads and the resultant off-loads available, as well as the number and type of tankers, are determined by Headquarters SAC based on receiver needs, tanker gross weight takeoff capability, tanker-sourcing availability, and landing rights.

3. **KC-135/KC-10 Description and Compatibility.**

a. The KC-135 has been produced in various models (i.e., 135A/R/E). Each model has its own performance capabilities and is compatible with Navy-Marine aircraft as described in NAVTOPS and US Air Force Flight Manual Technical Orders (TO) 1-1C-1-33. Reference to these publications is required to ensure mission success. The KC-135 aircraft is normally equipped for boom-receptacle-type refuelings only. To make the aircraft compatible with probe-equipped aircraft requires the installation of a boom-drogue adapter (BDA) kit. The adapter kit can only be installed on the ground and requires approximately four hours of work by maintenance personnel. Once installed, the KC-135 can only off-load fuel to probe-type receiver aircraft.[1]

b. The KC-10 was produced with both a center-line boom and an off-right-center hose drogue-to-probe capability. Therefore, the aircraft can refuel receptacle and probe-equipped aircraft during the same mission.

However, due to the proximity of the boom and the hose, two different receiver aircraft cannot refuel at the same time.[2] A limited number of KC-10s are modified with wing-tip pods that can provide hose-to-probe refuelings (one hose pod per wing).[3] Although the different and multiple air refueling capability exists, coordination of multiple use should transpire. This is due to mission timing, type of fuel to be off-loaded, and receiver needs.

4. **Land-Based Tanker Mission Options.** In addition to providing an immediate large off-load to receivers as illustrated in figures A-1 and A-2, the tankers have other capabilities to enhance mission success and provide more mission options. These options or enhancements include:

a. refuel a composite boom and hose-drogue task force during the same sortie (KC-10 only, or KC-135 with KC-10, or a mixed cell of KC-135s);

b. ferry fighter/attack replacement aircraft to the CVBG or to shore bases;

c. release Navy "buddy" air refueling attack aircraft to their attack role (A-6/7s);

d. provide postattack air refuelings, as required;

e. loiter in a designated area to provide fuel on an "as required basis";

f. ferry passengers and cargo to forward operating locations while refueling en route (transpac or translant);

g. provide pathfinder support as required;

h. provide a command and control platform with an inherent UHF/VHF/HF/SATCOM multicommunication capability (includes tanker to receiver aircraft, tanker to CVBG, tanker to shore, or NCA capability);

i. enhance margin of deck safety for foul weather return or emergencies (i.e., North Atlantic/Pacific);

j. provide E-6 refuelings as necessary;

k. extend VSTOL aircraft range and loiter time;

l. provide JP-5 (as coordinated);

m. decrease "on tanker" time with a multiple hose-drogue capability;

n. may be used in conjunction with Navy "buddy store" KA-6/7 aircraft;

o. extend CAP orbit time/capability to help to extend defense in-depth;

p. provide an over-the-horizon, undetected, surprise attack capability; and

q. provide for alternative axis of attack that is otherwise not possible.

5. **Land-Based Tankers Enhance Strike Force Capability.**

a. **Strike Force Enhancements.** In addition to providing increased fuel and enhancing other mission options, land-based tankers can extend strike force power. Although not all-inclusive, the following examples illustrate three missions that can be enhanced by utilizing land-based tankers. In each case land-based tankers increase strike force and CVBG flexibility, range, firepower, and survivability. In addition, LBTs can provide the strike force the element of surprise while contributing to economy of force.

b. **Example Missions.** All three of the options are provided as examples and are not all-inclusive. Mission planners and operators are expected to be imaginative and flexible, based on the rules of engagement, threat, and inherent capability. It is recognized that the following missions are most usable, and their chances of success are most probable, when utilized in the mid-to-low spectrum of war. Therefore, the best utilization of land-based tankers is considered to be in response to limited conventional wars, crisis response, limited attack options, or low-intensity conflicts. Accordingly, the following mission options are provided as planning examples or illustrations only.

(1) **Deep Strike.** Land-based tankers can provide the capability for the CVBG air wing to strike targets otherwise geographically out of range, either on land or at sea.[4] This enhancement is a result of the increased fuel off-load capability of the large KC-135 and KC-10s. (Off-load capability is illustrated in figures A-1 and A-2.) To achieve this mission would require the tankers to rendezvous with the CVBG aircraft and either immediately off-load the required fuel or to escort the strike aircraft to a predesignated point and refuel and either return to base or await the strike force for poststrike refueling before escorting the receivers to the carrier or a land base. Figures A-7, A-8, and A-9 are used to illustrate different mission rendezvous options, while figure A-3 is used to illustrate the deep strike option.

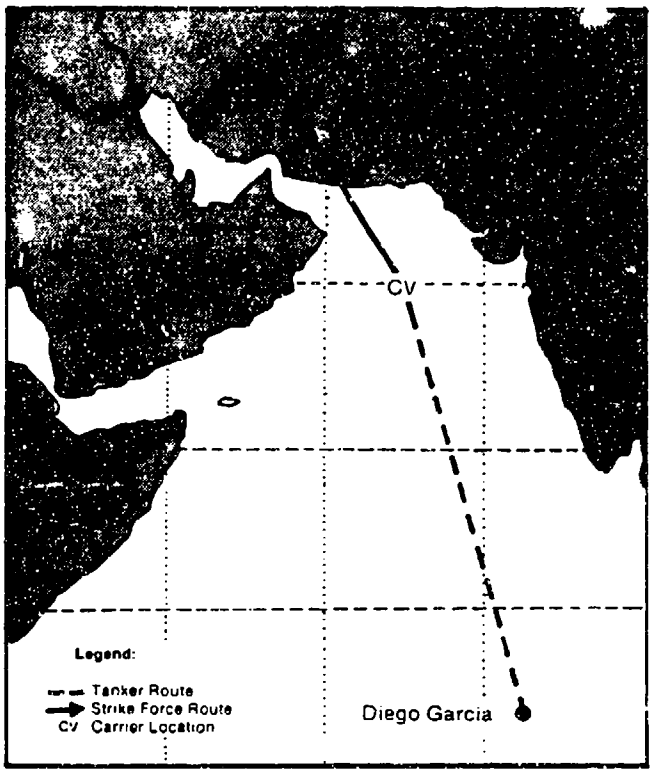


Figure A-3. Deep-Strike Mission.

(2) **Standoff.** The standoff mission option could allow the CVBG to remain at a safe distance, over the horizon, out of targetable surface-to-surface range, or other enemy threats and be able to strike targets not otherwise available without the large fuel off-load capability provided by KC-135s or KC-10s, as shown in figure A-4. Inherent within this standoff mission is that it allows the CVBG to remain on a middle-to-low alert posture, thereby reducing tension and strain on naval crew members aboard ship. However, other factors may need to be considered such as Navy aircraft sortie regeneration and rescue ability. The standoff mission therefore helps to reduce CAP requirements and aircraft/aviator short-notice launch requirements. This is possible because the CVBG can be placed outside the range of unrefueled land-based enemy strike aircraft or other surface threats.[5]

(3) **Strike while Steaming.** The strike-while-steaming mission option requires the tanker force to rendezvous with the aircraft from the CVBG, escort them to the refueling area, and await the receivers for poststrike refuelings for return to the CVBG. This option allows a strike capability while the CVBG is moving toward or away from an area of crisis. It presents a timely strike capability over hundreds or thousands of miles and helps to deter higher levels of violence when time is of the essence. Figure A-5 is used to illustrate this option.

c. **Coordination Is Required.** Once it is decided that land-based tankers are a feasible option to enhancing mission success, the next step is to contact the appropriate people and agencies so the SAC tanker managers can provide the specific support desired or requested. The points of contact are listed in paragraph 6b.

6. **How to Obtain Land-Based Tanker Support.**

a. **LBTs Are Available.** When required, land-based tankers can be made available. In case of contingency, crisis control, or low-intensity conflicts, Air Force tankers are requested by the appropriate unified commander in chief through the Joint Chiefs of Staff.[6] The JCS in turn tasks the Strategic Air Command for tanker support. SAC then tasks in-place tanker units or creates a tanker task force to support the requirement. Timely requests and proper information is mandatory for adequate planning to occur.

b. **Points of Contact.** Listed below are the points of contact for requesting and obtaining information about land-based (Air Force) tanker support. It should be noted that the first point of contact for unscheduled crisis response is the JCS. During normal training or exercises AFR 55–47 applies and the Navy personnel need to contact their naval air refueling coordinator. At the same time the JCS is notified. Headquarters SAC and Headquarters USAF/XOOTS should be informed via the same message. This action will inform the proper people or agencies and help to ensure a timely response as to tanker capability.

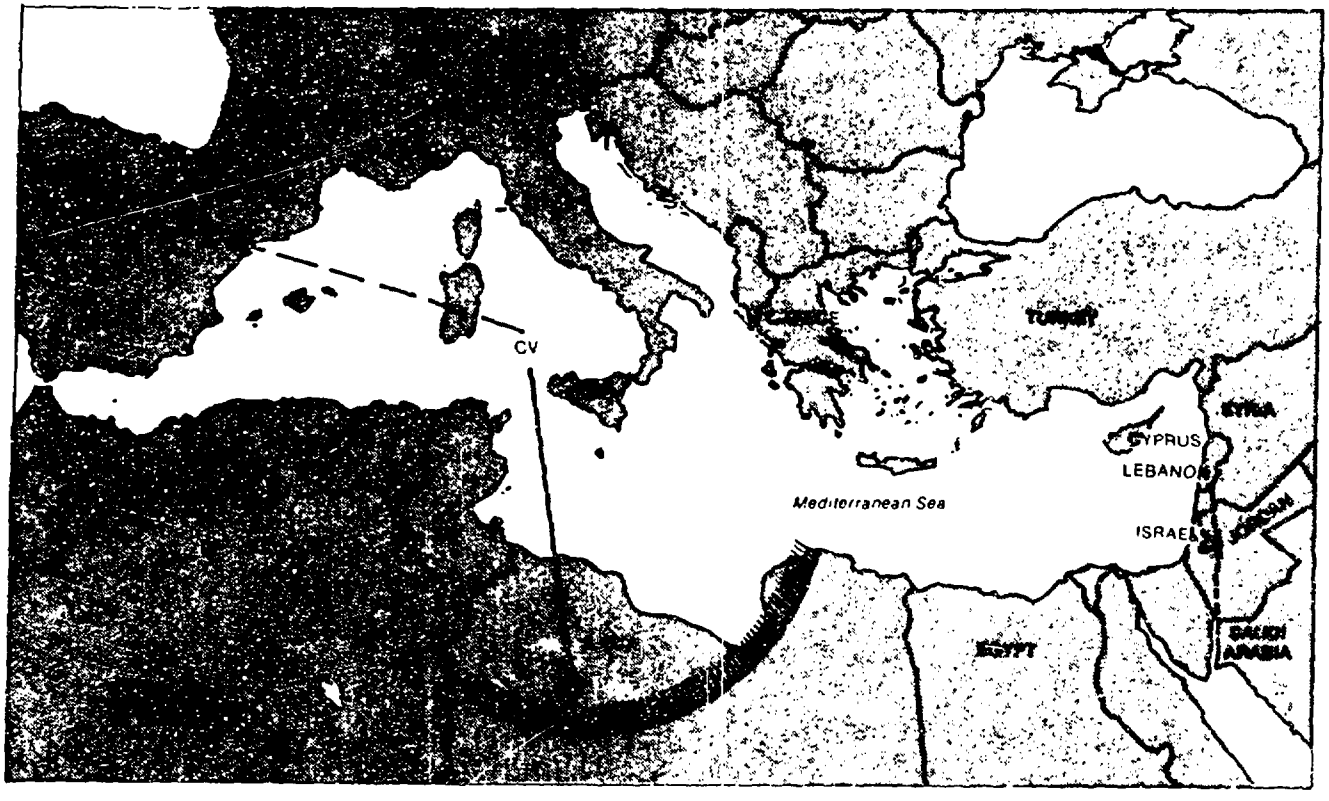


Figure A-4. Standoff.

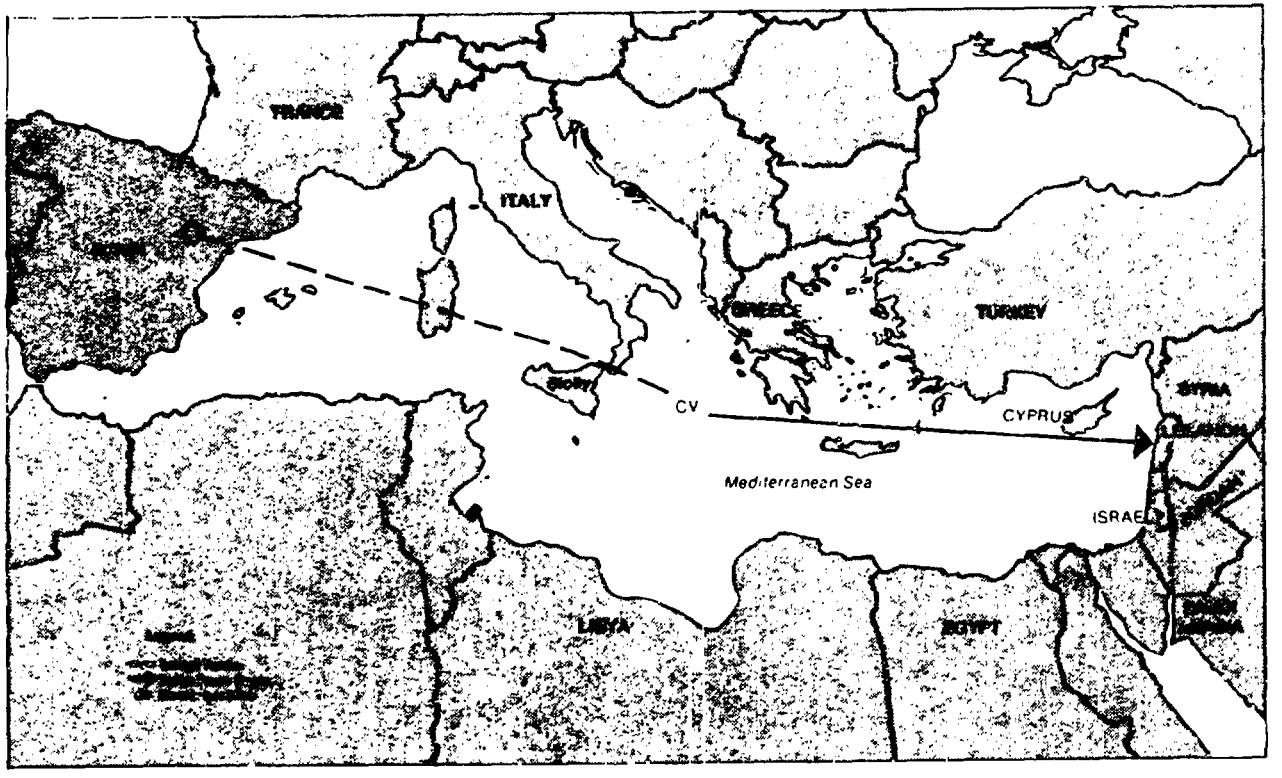


Figure A-5. Strike while Steaming.

(1) Joint Chiefs of Staff*

a. Office symbol: JCS/J-3
b. Message address: JCS WASH DC//J-3 JOD//
c. AUTOVON: 225-2533/0483

(2) National Military Command Center

a. Office symbol: JCS/NMCC
b. Message address: JCS WASH DC//NMCC//
c. AUTOVON: 227-6340/8322

(3) Headquarters Strategic Air Command (SAC)

a. Office Symbol: HQ SAC/DONS/DONT
b. Message address: HQ SAC OFFUTT AFB//DONS//DONT
c. AUTOVON: 271-4857/7220

(4) Headquarters SAC Command Post

a. Office symbol: HQ SAC/DOC
b. Message address: HQ SAC OFFUTT AFB//DOC
c. AUTOVON: 271-1800

(5) Headquarters United States Air Force (info only)**

a. Office symbol: AF/XOOTS
b. Message address: HQ USAF WASH DC//XOOTS// XOOOE
c. AUTOVON: 227-1666/4095

c. **Coordination Process.** Headquarters SAC, after a JCS tasking or after an information request has been received, will provide detailed specifics on each air refueling support request. To ensure timely and correct information is presented in reference to an air refueling request, receiver specific information must be provided to SAC. The sample message below illustrates a format to be used when requesting land-based tanker support for a crisis response option, low-intensity conflict situation, or contingency situation as described in an AFR 55-47, category C mission. As much information as possible should also be provided during initial telephone contact. Direct communication between the requesting agency and Headquarters SAC is encouraged. Sample message format to request LBTs is illustrated in figure A-6.

d. **Preliminary Data Is Required.** Although all of the information as requested in the message facilitates the entire air refueling planning and accounting process, the lack of specifics should not unduly delay an initial request for information on tanker support.

In such cases Headquarters US Air Force/Strategic Air Command personnel will establish contact with individuals within the Department of the Navy to ensure that coordination occurs so the mission can continue

*If not during normal duty hours contact the NMCC or Headquarters SAC Command Post and ask duty controller for a DONT/DONS on-call individual.

**Headquarters USAF/XOOTS (tanker division) is informed to ensure coordination occurs between all headquarters USAF/CNO/CMC staff agencies and lower echelons as required.

FROM: CINCLANTFLT, CINCPACFLT, CINCUSNAVEUR, CMC (as applicable)
TO: JCS, HQ USAF, WASH DC//XOOTS//XOOE
INFO: HQ SAC, OFFUTT AFB NE//DONS//DONT

Classification

Subj: Request for KC-135/KC-10 AAR Support.

1. Request KC-135/KC-10 AAR support for XXXXX.
2. Mission(s) information follow(s):
   a. Date of mission(s).
   b. Number and type(s) of receiver aircraft.
   c. Off-load desired per receiver.
   d. Boom or hose-drogue (or both).
   e. Total off-load.
   f. Air refueling base altitude.
   g. Air refueling track or anchor.
      (1) RZIP.
      (2) ARCP.
      (3) ARCTs (Zulu).
      (4) EAR.
      (5) Anchor box coordinates.
   h. Type of RZ (point parallel en route, etc.).
   i. Loiter time required.
   j. EMCON requirements.
   k. Air traffic control procedures (overt ICAO or covert flight plan).
   l. JP-5 requested or mandatory.
   m. Tanker to CVBG communication procedures.
   n. Tanker to CVBG friendly approach procedures.
   o. Aircraft (by type call signs).
   p. Communication plan for air refueling (primary, secondary, beacon, air-to-air TACAN).
   q. Tanker liaison officer requested aboard ship.
3. Billing information (IAW MOU).
   a. DODAAC of squadron or station of aircraft to be refueled (as a minimum).
   b. Signal code.
   c. Fund code.
   d. Tail number and bureau of aircraft.
   e. Julian date refueling(s) to occur.
4. Special requirements.
   a. Cargo or passenger transportation needed.
5. Point of contact.
   a. Name, telephone number, message address.

Figure A-6. Sample Message Format to Request LBTs.

as necessary. Do not delay the tanker request for lack of specific air refueling data. Experience has shown that the sooner the request is made the better the support provided.

7. **Land-Based Tanker Reaction Capability.**

a. **LBTs CONUS and Overseas.** US Air Force land-based tankers are positioned at various locations throughout the United States and other parts of the world and can be made available upon receiver request. Under a normal peacetime environment Headquarters SAC has numerous Air Force KC-135s and KC-10s that may be stationed at the following locations.[7]

(1) Andersen AFB, Guam;
(2) Eielson AFB, Alaska;
(3) Kadena AB, Japan;
(4) RAF Fairford, United Kingdom;
(5) RAF Mildenhall, United Kingdom;
(6) Reykjavik, Iceland;
(7) Riyadh, Saudi Arabia; and
(8) Zaragoza AB, Spain.

b. **Tanker Task Force Creation.** In addition to the locations listed above, Headquarters SAC can create, as necessary, a temporary tanker task force that can operate out of forward locations (i.e., naval bases) to support special air refueling requests. The location of such a force is scenario dependent and usually includes such factors as State Department or foreign country approval, distance to the air refueling area, length of runway and its environmental factors, logistical capability, and fuel availability. However, each operating location is chosen by Headquarters SAC, and the tanker logistical support package will be tailored to meet receiver needs as necessary to ensure mission success.[8] Accordingly, tanker support is dependent upon where the tanker is allowed to operate from, how far it must travel to off-load the fuel, loiter time, total fuel off-load required, and recovery base. Therefore tanker reaction capability is scenario dependent upon receiver needs and the location the tankers are allowed to use as a forward base. The single most important factor in creating a temporary tanker task force to support a special request is for the receiver unit to contact Headquarters SAC in such time to allow creation and possible movement of tankers to the forward location. Therefore, tanker reaction capability is directly related to the timeliness of the receiver request.

Notes

1. KC-135A Flight Manual, TO 1C-135(K) A-1, 4-151-153.
2. KC-10A Flight Manual, TO 1C-10(K) A-1, Douglas Aircraft Company, 1.15-3.
3. Maj Tom Trainor, Headquarters USAF, Washington, D.C., telephone interview with author, 2 November 1988.
4. Briefing, Douglas Aircraft Company, subject: KC-10 Land-Based Tanker Support for Navy on Broad Ocean Area, Compilation of data 1985-1986.
5. Capt John Castor, USN, Air War College, interview with author, 7 January 1989.

6. Memorandum of understanding between the Department of the Navy and the Department of the Air Force, subject: Air Refueling Support for Navy Operations, 16 November 1988.

7. Trainor interview.

8. SAC Regulation 55-41, *Tanker Task Force Operations*, 13 October 1983, 1-1.

Section 4

Employment Operations

The tanker task force commander (TTFC)—as the representative of the commander in chief, Strategic Air Command—will conduct task force operations in accordance with Strategic Air Command (SAC) policies and the applicable OPLAN/OPORD/FRAG Order(s). Additionally, and within the limits of task force ability, the TTFC will support the air refueling requests/requirements of the carrier battle group (CVBG) commander or his appropriate alternate. When a task force is required to operate from forward area bases with minimum facilities, the TTFC will be prepared to carry out the operation without immediate guidance or direction from Headquarters SAC. If the urgency of the mission precludes coordination with or execution by the SAC Command Post, the TTFC is authorized to launch sorties in response to mission timing generated by changing requirements.[1]

1. **Extended Operations.** Extended operations of a temporary tanker task force require special considerations over a one-time deployment or specific mission. Headquarters SAC will determine the crew-to-aircraft ratios and augmentation requirements based on type of mission, sortie requirements, and mission duration. Additionally, the composition of task force team member logistic support and the numbers of personnel may be increased to ensure sustained operations.[2] Accordingly, Navy operational planning must be based on realistic employment sortie timing and air refueling needs.

a. **Daily Planning.** Tanker mission planning generally occurs the day prior to the mission. Navy requests for next-day air refueling activity must arrive at the TTFC forward operating base in time to allow adequate planning. In event of changes the TTFC must be notified immediately.

2. **Mission and Rendezvous Options.** Numerous mission options for LBT air refueling support are available; however, the rendezvous between the tanker and receiver force in an open ocean area demands precise planning, timing, and adherence to established procedures. This is especially important when the CVBG is in transit or desires to remain undetected. Three possible options for rendezvous are described below. Note that the specific type of rendezvous—such as point parallel, ground controlled intercept (GCI), or anchor, etc.—will be coordinated between forces depending on airborne equipment available.

a. **Option One: Overhead.** This option involves the tanker force proceeding to the carrier, orbiting, or completing the rendezvous with the strike force, as required, and either refueling or proceeding to an end air refueling (EAR) point, as shown in figure A-7.

b. **Option Two: Radial/DME.** This option involves the tanker force proceeding to a predetermined geographic point (a tacan radial/DME) and

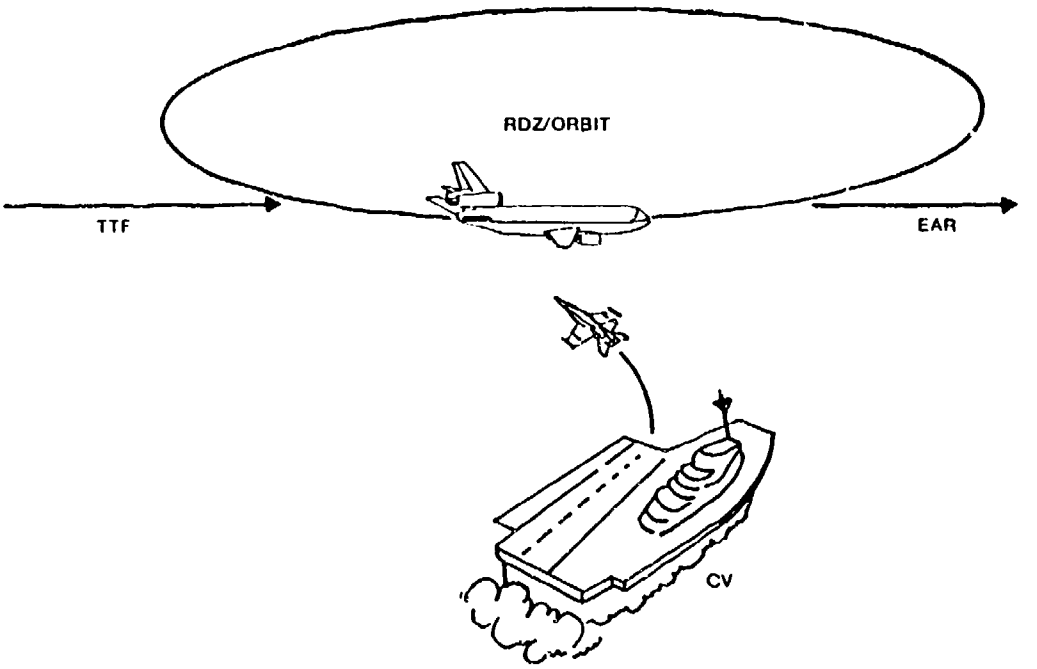


Figure A-7. Overhead.

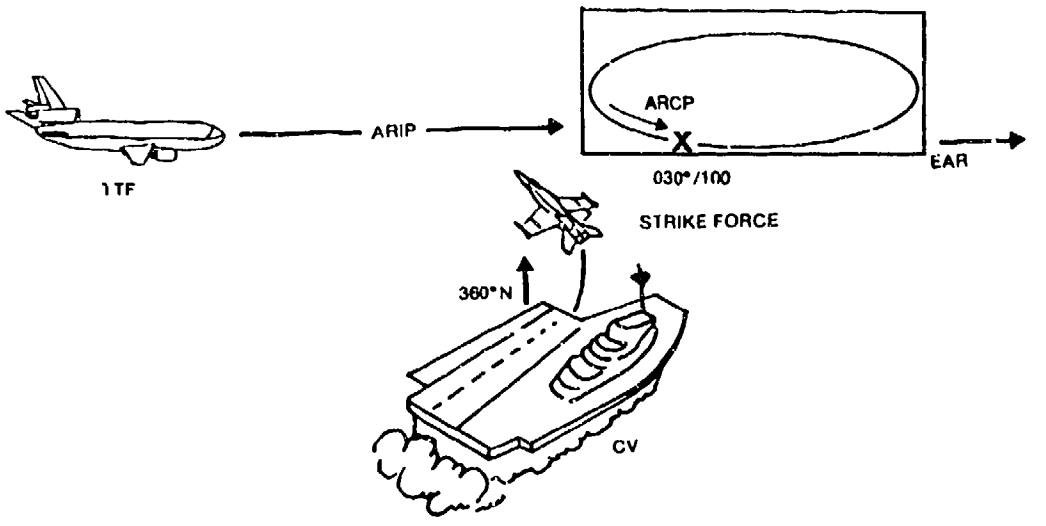


Figure A-8. Radial/DME.

completing the rendezvous with the carrier tactical aircraft. The radial/DME may be from a land position or aboard ship. The force then refuels as planned to EAR. Figure A-8 illustrates this option.

c. **Option Three: Latitude/Longitude.** In this option protection of the location of the CVBG is planned. The tanker and receiver force individually proceed to a predetermined geographic point, rendezvous, air refuel, as required, and continue to the EAR point. Figure A-9 illustrates this option.

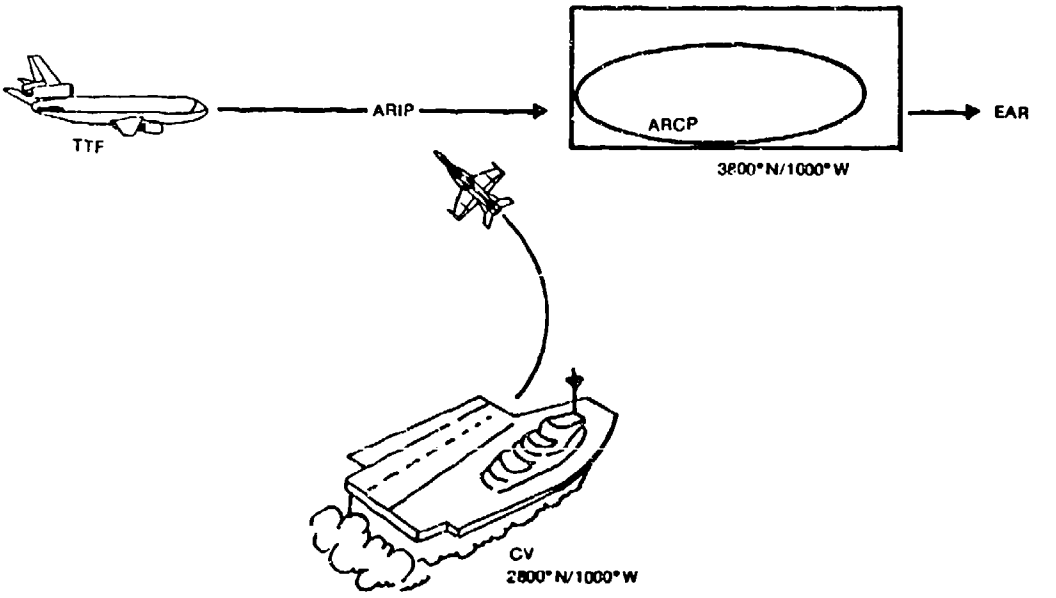


Figure A-9. Latitude/Longitude.

Notes

1. SAC Regulation 55-41, *Tanker Task Force Operations*, 13 October 1983, 4-1.
2. Ibid., 4-1, 4-2.

Section 5

Command, Control, and Communications

It is well recognized that the foundation of mission success largely lies within the command, control, and communications arena. Accordingly, the establishment of definite responsibilities, lines of communication, and chain of command is necessary.

The command and control (C^2) of US Air Force and Navy aircraft that operate jointly in the maritime environment is hampered by the vast open ocean areas and the great distances of potential operation. These geographic factors demand the careful selection of a C^2 structure and the assignment of responsibilities. To support the commanders a communications network and system must be chosen that provides an immediate linkage between the commanders and their forces. The following paragraphs describe this relationship necessary. See figure A-10.

1. **Air Force and Navy Agreements.** Several years of joint Air Force and Navy air refueling activity has resulted in a series of memorandums of understanding (MOUs) and agreements (MOAs). These memorandums represent the joint interests of both agencies and reflect the official position of each service as signed by the chief of the Department of the Navy and the Department of the Air Force. Accordingly, the area of command and control of the joint force for LBT support of carrier battle group (CVBG) has been agreed upon and falls into two distinct areas. Land-based tanker support of the carrier battle group and SAC termination of air refueling support.

a. **C^2 during LBT Support of CVBGs.** Both services have agreed, and the MOU specifically states, that for land-based tanker support of CVBG operations as well as E-6A strategic communications operations, the commander in chief, Strategic Air Command (CINCSAC), will retain operational control of the tanker assets at all times. Tactical control will be executed by the carrier battle group commander.[1]

b **SAC Termination of Air Refueling Support.** Due to the shortage of national air refueling assets, it may be necessary for Headquarters SAC to withdraw air refueling support for CVBG operation. Accordingly, both services have agreed, and the MOU specifically states, that in the event of defense condition (DEFCON 3), or as directed by the Joint Chiefs of Staff (JCS), SAC may be required to terminate air refueling support.[2]

2. **Command Concepts.** The successful command and control and the integration of two air forces that are not collocated demand clear-cut lines of responsibility and authority. Both services—the Navy and the Air Force—have devised concepts that have proven successful. Accordingly, these two concepts represent the most logical framework whereby land-

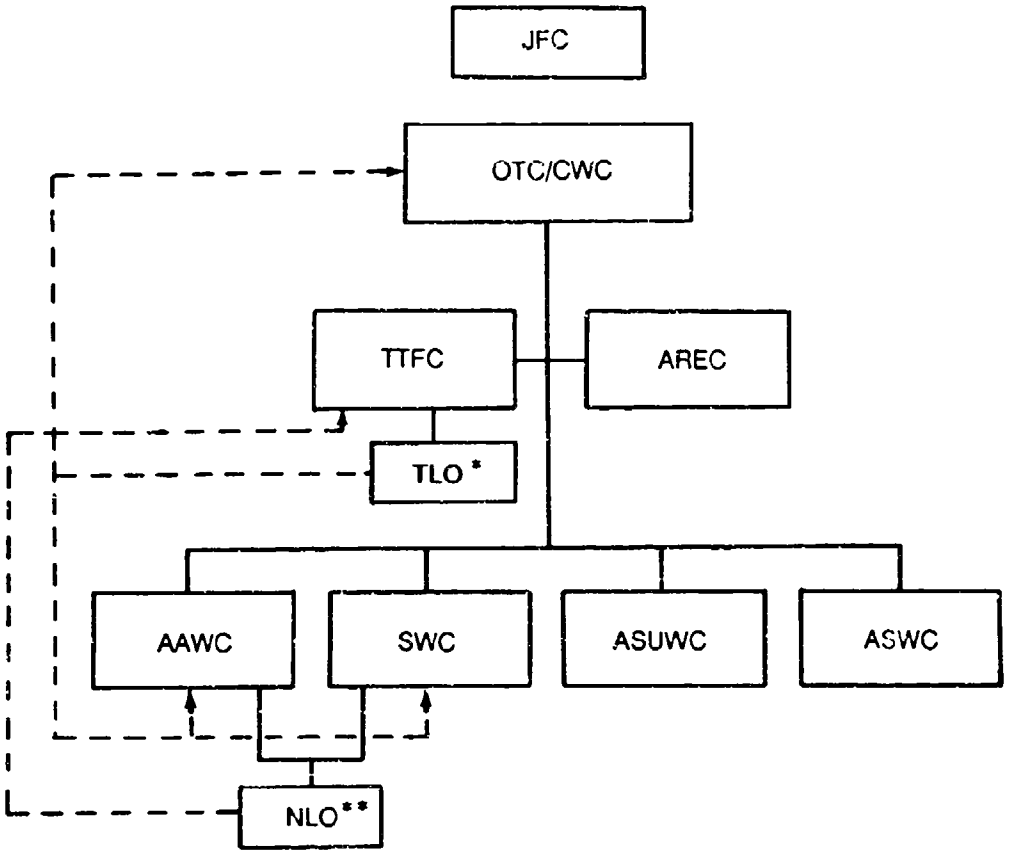


Figure A-10. Joint CWC/TTFC Command Structure.

based tankers can be requested, organized, and employed in support of Navy CVBG operations.

a. **Navy's Composite Warfare Commander Concept.** The Navy's composite warfare commander (CWC) concept is a proven war-fighting method. As described in JCS Pub 3-04, *Doctrine for Joint Maritime Operations (Air)*, the CWC concept

> allows the Officer in Tactical Control (OTC) to conduct combat operations against air, surface, and subsurface threats while carrying out the primary mission of his force. The CWC concept is capable of flexible application to any naval task force (TF) or task group (TG) operating at sea. In particular, the concept is applicable to the battle force that groups two or more CVBGs and supporting units.[3]

b. **SAC's Tanker Task Force Concept.** The SAC tanker task force concept is a proven method to source, organize, and employ land-based tanker assets in support of receiver air refueling requests. As a need arises, Headquarters SAC will task a tanker air refueling wing that is located in the continental United States, a permanent tanker task force located

overseas (as illustrated in chapter 3, paragraph 7a), or create a temporary tanker task force to operate out of a forward location.[4]

SAC Regulation (SACR) 55-41, *Tanker Task Force Operations*, establishes the basic organization of tanker task forces (TTFs) as well as standardizing the planning and operation of the tanker task force concept. Control execution and logistical support of the SAC force will remain within the parameters of SACR 55-41.[5]

(1) **Tanker Task Force Commanders**. Headquarters SAC in response to a JCS request to support an AFR 55–47, category C, air refueling request (unscheduled, crisis, limited war) will appoint a tanker task force commander. This appointment will be as directed by commander in chief, Strategic Air Command, or as specified in SACR 55-41. The appointed tanker task force commander (TTFC) is responsible for forming a coordinated functioning force of personnel and aircraft that are assigned to the TTF.[6] The TTFC has control of all assigned SAC forces until such time the mission is complete or the tanker task force is relieved of its air refueling responsibility. The TTFC is responsible to CINCSAC and will serve as operational commander in support of Navy requests. The TTFC may appoint a qualified SAC officer, as necessary, to serve aboard ship with Navy personnel.[7]

3. **Command Relationships**. To ensure LBT responsiveness and to guarantee full support within the capability of the tanker fleet requires a workable relationship whereby the tanker commander or TTFC, as appropriate, can report directly to the naval CVBG commander or the officer in tactical control or his alternate, as directed.

A SAC tanker liaison officer may support the TTFC, who is generally physically located with the land-based tanker fleet, perhaps thousands of miles from the location of the CVBG. In this way shipboard tanker personnel can provide an immediate response to time-sensitive issues. Therefore, the command relationship calls for the TTFC to be responsible to the naval officer in tactical control and to ensure land-based tanker air refueling support is provided for the CVBG or other air operations as necessary to the maximum extent allowed within his capability. To assist the TTFC in this task an appointed SAC tanker liaison officer may be located on board ship. His duties are to coordinate and provide timely information to Navy personnel on tanker matters within the constraints of the TTF that he is associated with.

4. **Joint Composite Warfare Commander–Tanker Task Force Commander Command Structure**. If directed, a joint force commander (JFC), in accordance with JCS Pub 3-04, or an officer in tactical control (OTC) or a composite warfare commander (CWC) will exercise overall responsibility for C^2 of the force and will be responsible for the accomplishment of the mission.[8] Subordinate to JFC, OTC, or CWC are four principal Navy warfare commanders: the antiair warfare commander (AAWC), the strike warfare commander (SWC), the antisurface warfare commander (ASUWC), and the antisubmarine warfare commander (ASWC). (Note that OTC is normally the CWC.) Supporting the JFC, OTC, CWC, and warfare commanders is the air element coordinator (AREC), who is responsible for managing and

coordinating the distribution of carrier aircraft and advising the other warfare commanders of carrier air, and during joint activity, LBT air refueling operations or activities.[9] Accordingly, the TTFC, as the AREC, will be in an advising and coordinating role on matters pertaining to SAC aerial refueling during joint operations. Of all the Navy warfare commanders, the SWC and the AAWC are the two most likely to be involved with LBT support. Accordingly, the SAC tanker liaison officer, when appointed, will be assigned to work within the SWC or the AAWC planning cell (or others as directed) to ensure proper land-based tanker support is coordinated and is within the capability of his TTF capability. In addition, the AAWC or SWC may appoint a Navy liaison officer to coordinate with the TTFC, on shore. This action will facilitate operational planning at both locations and help to ensure both services have immediate access to the other's operational capabilities. Both liaison officers should be current and qualified in their respective aircraft and have in-depth operational knowledge of all aircraft being utilized within their service. Additionally, the tanker liaison officer will ensure proper interface with the AREC—and other Navy personnel as deemed necessary—and complete final coordination as appropriate with his TTFC. Figure A-10 illustrates the Joint CWC–TTFC command structure.

a. **C^2 Timing.** Command and control of the joint force is dependent on the tasking from JCS or as coordinated between the Navy and Air Force. If no specific timing information is provided from JCS or the services, the SAC tanker task force commander, or his equivalent, has command authority of the assigned Strategic Air Command–Air Reserve Forces tanker force until such time as the tanker force is staged at a location and capable of supporting the Navy commander. At that time the TTFC retains control of the tanker force but responds to the timing and taskings as appropriate by the JFC, or OTC–CWC. At all times the TTFC will operate within the regulations and guidelines as presented by the Air Force. The tanker force will support naval requests until such time as the mission is completed, recalled in accordance with DEFCON 3 procedures, or relieved of the tasking.

5. **Communications.** Communications between forces should be consistent with proper operations security and communication security procedures. Due to the nature of a joint service strike force that may be separated by thousands of miles, exact communications systems available at forward locations and the CVBG are not predictable. However, planners must ensure that communications systems, including space-based systems, employed by or supporting the joint force must be capable of providing secure, jam-resistant, near-real-time exchange of essential information between the CVBG commander or the officer in tactical command and subordinate commanders. The systems must be flexible and responsive to allow timely redirection of the airborne force(s). Additionally, degradation of these systems must be integrated into the plans and operations.[10]

a. **Ship-to-Shore Communications.** All CVBG ship-to-shore TTF location communications will be as directed by the officer in tactical control or as coordinated between the TTFC and the OTC.

b. **Airborne Communications.** Communications that are necessary between land-based tankers and carrier aircraft will be in accordance with the agreed upon communications/rendezvous (C/R) plan or management of electromagnetic radiations (EMCON) plan and the carrier battle group's directed friendly force procedures. Care should be taken so as not to allow inadvertent emissions between aircraft, or from aircraft to CVBG, when within listening range of enemy forces. A proper EMCON option should be planned dependent on the threat assessment.

Notes

1. Memorandum of understanding between the Department of the Navy and the Department of the Air Force, subject: Air Refueling Support for Navy Operations, 16 November 1988, attachment 8.
2. Ibid.
3. Joint Chiefs of Staff Publication 3-04 (Test Pub), *Doctrine for Joint Maritime Operations (Air)*, 1 May 1988, A-1.
4. SAC Regulation 55-41, *Tanker Task Force Operations*, 13 October 1983.
5. Ibid., 4–1.
6. Ibid., 2–1.
7. Ibid., 4–1.
8. JCS Pub 3-04, A-2.
9. Ibid., A-3.
10. Ibid., III-2.

Section 6

Lessons Learned

The following list of lessons learned is based on years of joint air refueling experience. Each lesson experience or subject area may be followed by a short explanation of the importance of the specific lesson. The list is not an all-inclusive one but highlights those items that frequently mean the difference between a successful mission, one that needs significant improvement, or one that fails. Mission planners and operators from the tanker and receiver force should review this list as it pertains to the scenario being considered.

1. **General Planning.**

a. **Rules of Engagement/Safety.** What guidelines are imposed that permit or limit air refueling or strike force activity? For example, if the tanker-fighter loses performance capability (i.e., an engine) should it continue the mission? What equipment is required for the strike aircraft to continue to the target?

b. **Short-Notice Taskings.** Short-notice taskings place an additional burden on staff, maintenance, and air crews. All must coordinate and agree they can respond to short-notice requests.

c. **Liaison Officer.** Use of a tanker liaison officer aboard ship or a naval liaison officer with the TTF can provide immediate air refueling or receiver information and is necessary.

d. **Mission Coordination.** History and experience have illustrated that people who provide initial planning estimates need to coordinate with appropriate agencies. Planning in isolation fails to recognize up to date true operational capability.

e. **Mission OPSEC–COMSEC.** Operations security and communications security must be emphasized at all levels to ensure mission success.

f. **Protecting the Location of the CVBG.** Although land-based tankers can contribute to CVBG air operations, they also may contribute to the vulnerability of the CVBG if proper precautions are not taken. Accordingly, proper OPSEC, rendezvous, and communications procedures must be utilized to conceal the geographic location of the CVBG if such operations would place the CVBG in danger.

g. **Agency Points of Contact.** A knowledgeable point of contact should be established for each mission within each concerned agency. This ensures continuity and helps to ensure total mission planning and employment considerations are taken into account.

h. **Air Refueling Capability.** Off-loads available and support provided are often a result of timely receiver requests. However, it must be understood that tanker capability is dependent upon many other factors and that exact plans should not be based on preliminary data. SAC planners will finalize off-load capability and the exact numbers of tankers required

or available. A fully coordinated plan will be agreed upon between Navy and SAC personnel prior to mission execution.

i. **Tankers in a Threat Environment.** Tanker aircraft are unarmed and are not usually introduced into an area of enemy surface or airborne threat. If mission details dictate such action, CAP aircraft need to be scheduled.

j. **Command and Control.** See chapter 5.

k. **Mission Preplanning.** Check tanker gross weight (minimum air refueling speed) for receiver-specific air refueling data. Operating tankers at heavy gross weights may present problems at slower airspeeds.

l. **JP-5 Fuel Availability.** Carrier flight deck operations are enhanced by US Air Force tankers providing JP-5 fuel when available. This action saves deck flush time and reduces fire hazard due to the different flash points between JP-4 and JP-5 fuels. Both the KC-10 and KC-135 can burn JP-5 fuel. Naval planners should coordinate need of JP-5 fuel.

m. **Tanker to CVBG Communications.** Tanker shore-based personnel and airborne tanker crews must ensure a communications link is available to confirm mission changes with the air wing. Navy personnel will provide this information.

n. **Aircraft Security.** Forward operating bases (FOBs) and overseas locations present special security precautions for LBTs. Tanker aircraft need to be protected based on destination threat assessment. Crew members should be provided an intelligence briefing prior to deployment and adequate security measures taken.

o. **Tropical Day Performance.** Operation in hot climates may restrict level-off altitude and affect fuel burn rate and timing. Ensure proper data is used.

2. **Ground Activity.**

a. **Adequate Maintenance.** The numbers and type of maintenance personnel are critical to ensure mission success. This is especially true when tankers are operated out of FOBs and multiple sorties are to be flown in support of forward deployed forces.

b. **Tow Bar.** Depending on parking and taxiing capabilities, a KC-135/KC-10 tow bar may be required. Tanker crew members should check airfield diagram. If in doubt they should take a tow bar for each type aircraft.

c. **Airfield Diagram.** A review of the airfield diagram and its facilities is a must to ensure adequate taxiing, turning, and parking of tanker aircraft. KC-10s require at least a 75-foot taxiway. Refer to Strategic Air Command Pamphlet 55-26, *KC-10 Planning Guide for Staff Personnel*, for more specifics to include LCN capability.

d. **Ground Refueling Capability.** The refueling capability of the specific location should be reviewed to ensure adequate time is planned between sorties. Consider trucking the fuel as necessary. Coordinate use and availability of JP-5 fuel.

e. **Flight Crew/Crew Duty Limitations.** Movement of aircraft and crews should allow for proper crew rest for US Air Force air crews prior to follow-on sorties. Additionally, adequate crew rest is required between sorties.

f. **Aircraft Loading.** Proper onload and off-load equipment is required to ensure timely delivery of cargo. In addition, adequate time must be allowed for the off-loading or uploading of cargo for the tanker aircraft. Naval specific cargo requests should be made to Headquarters Strategic Air Command.

g. **Billeting and Messing.** The availability of billeting and the feeding of crew members must be planned when operating at FOBs.

h. **Transportation.** Crew ground transportation should be coordinated to ensure sortie timing requirements are met.

i. **Tanker Crew Ratio-Auxiliary Crew Members.** Extra crew personnel need to be planned to ensure mission success based on sortie length, sortie type, frequency, and duty not to include flying (DNIF) cover requirements. Naval liaison officers may fly with tanker crews to facilitate the completion of the mission.

j. **Special Personnel Requirements.** Past experience has shown that certain countries friendly with the United States do not allow female military personnel to enter their country. Additionally, they may have restrictions on the dress of female personnel. This sensitive area requires coordination with State Department personnel. Also, a restriction on the number of US personnel may be requested.

k. **Foreign Clearance Guide.** Review for specific considerations that include dress, currency, and immunizations.

l. **Classified Storage Facilities.** FOBs may or may not have storage facilities for classified material.

m. **Mission Planning Materials.** Many FOBs do not have any mission planning materials. Crews should be able to provide their own materials and mission plan accordingly. This includes charts, instrument approach procedures, and forms, as required.

n. **KC-10 Aircraft Specific Requirements.** If no KC-10 lavatory truck servicing capability is available, plan accordingly.

o. **KC-135 Aircraft Specific Requirements.** Check the availability of demineralized water for KC-135A model servicing. If not available, deploy a demineralization kit(s), as required, and plan ground times accordingly. Ensure an adequate water supply is available for use.

p. **Aircraft Spare Ratio.** Mission timing, or the importance of the mission, may require a ground and or an airborne spare aircraft. Clarify this factor as appropriate. Include any airborne spares into the air refueling requirement.

q. **Special Communications Equipment.** FOBs may not provide telephone, high frequency (HF), or other voice communications capabilities. Coordinate as required with communications experts for communications personnel to bring a portable communications net.

r. **Probe—Drogue versus Boom Requirements.** Naval and tanker planners need to coordinate to ensure tankers are properly configured for drogue- versus boom-type refuelings. If both boom and drogue refuelings are to be used, ensure the proper aircraft with the proper configuration is at the proper ARCP at the correct ARCT.

s. **Communications Plan with Receiver Tanker Aircraft and CVBG.** Ensure EMCON procedures in the clear or ultra high frequency

(UHF) secure radio codes have been coordinated and properly set or tested. Ensure coordination of proper codes is checked and set with all concerned. Note that experience has shown that Navy and Air Force ultra high frequency secure codes may not be the same. Ensure compatibility.

t. **Dry versus Wet Runway Fuel Loads.** Tankers should plan take-off gross weight based on prevailing weather conditions. Experience has shown that when mission timing is critical, a conservative (wet data) approach is more successful. Increase tanker numbers as appropriate.

u. **Naval Standard Terminology.** Tanker crew members need to become familiar with standard naval operational brevity codes and coordinate special usage as necessary.

v. **Table Fly the Mission.** A well-planned mission can be improved if all associated personnel "table fly" their individual portion of the mission to ensure it meets the timing schedule and specific responsibilities. It should start with crew rest and continue through every step until the aircraft are parked and the crew departs. This step should include maintenance and transportation.

w. **Air Aborts.** Air aborts for both the tanker and receiver force must be considered. An alternate plan must be devised to ensure all airborne aircraft have access to alternate or abort bases as necessary. A receiver aircraft should never be placed in a position where it cannot safely reach a landing destination if unable to onload fuel during aerial refueling.

3. **Predeparture Activity.**

a. **Weather Briefings.** Certain FOBs may not provide predeparture weather forecasts. Coordinate as required to provide aircrews latest weather data for route of flight.

b. **Flight Filing Procedures.** File flight plan as appropriate (overt or covert). Coordinate overflight and covert activity considering OPSEC. Certain FOBs may require day prior filing.

c. **Plan Departure Using Nonoptimum Runway Timing.** Plan to take-off using nonoptimum runway timing. Build in mission timing triangles as appropriate.

d. **Runway Taxi Back Problems.** Certain airfields or FOBs require large aircraft (KC-10s) to enter the runway at a midpoint, taxi to the departure end, and execute a 180-degree turn before takeoff. This procedure usually is required because the aircraft is unable to negotiate 75-foot-wide to 75-foot-wide 90-degree turns on taxiways or on taxiways with FOD problems. In this case cell departures are not possible. Coordinate to plan a rendezvous for tanker aircraft after departure. Adjust mission timing and fuel accordingly.

e. **Departure Communication Procedures.** Coordinate on the open or silent launch procedures, as necessary.

f. **Ground Abort Procedures.** Coordinate ground abort procedures and resultant impact on the mission. Consider reconstitution and mission delay. Tell receiver coordinator immediately. If a cancellation or delay has occurred tell *all* concerned and coordinate next timing schedule.

g. **Mission Cancellations or Delays.** Personnel need to be very careful when coordinating mission changes. The term *cancellation* implies that the mission will not fly as scheduled on a specific day. The term *delay*

implies the mission is likely to or may fly at a later time depending on other decisions or variables.

4. **Airborne Lessons Learned.**

a. **Mission Timing.** Open ocean rendezvous require precise mission timing. All flight profiles should be checked and coordinated to ensure the slower and or faster air refueling airspeeds are reflected and flown. Therefore, both cruise and air refueling airspeeds need to be calculated along with the appropriate fuel burn rates for tankers and receivers.

b. **Tanker-to-Tanker Air Refueling.** Air refueling of other tanker (i.e., KC-135 to KC-10 or KC-10 to KC-10) to in-flight maximum gross weights requires specific planning in accordance with performance manuals. In general, the receiver KC-10 will have to descend to FL250 and increase airspeed as gross weight increases. Coordination is required with receivers (fighter) and air traffic control as necessary.

c. **Abort or Recall of Forces.** Procedures must be coordinated for possible airborne aborts or recall of the force. This must include all phases of the mission, prerefueling and prestrike and poststrike air refuelings as required. Tanker crews need to know and be able to escort receiver aircraft to alternate landing bases as necessary.

d. **Tanker Friendly Force Procedures.** Coordination is required to ensure friendly tanker aircraft can approach the CVBG. This is necessary for both prestrike and poststrike activity. Naval planners will provide this information.

e. **Tanker-to-Receiver Communications on Rendezvous Plan.** The C/R plan should be thoroughly understood and coordinated between the tanker and receiver force. This includes air refueling frequencies, both primary and secondary, beacon codes, air-to-air tacans and DF procedures. The plan must consider each receiver specific aircraft (i.e., F-18, F-14, A-7, and E-6).

f. **SAR Requirements.** Coordinate possible use of tanker search and rescue efforts with naval assets based on loiter time and threat.

5. **Postmission Activity.**

a. **Aircraft and Aircrew Reconstitution.** If necessary, brief crews on reconstitution plans and timing. Always be able to locate tanker crews under an increased tension scenario. Service the aircraft as necessary for next departure.

b. **Debrief Crews and Maintenance Personnel.** A good debrief ensures any lessons learned are surfaced and acknowledged.

c. **Mission Summary.** Both services need to prepare an after-action report.[1]

Notes

1. SAC Regulation 55-41, *Tanker Task Force Operations*, 13 October 1983, 3-9.

APPENDIX B

A Chronological Compilation of Navy/
Air Force Memorandums of Agreement/Understanding
Concerning Aerial Refueling Operations

Memorandum of Understanding

10 July 1981

MEMORANDUM OF UNDERSTANDING
between
THE DEPARTMENT OF THE NAVY
and
THE DEPARTMENT OF THE AIR FORCE

References:

a. Amended Program Decision Memorandum (APDM) for the Department of the Air Force, 20 August 1975

b. Joint AFR 400-27/SECNAVINST 4000.20B, "Basic Policies and Principles for Interservice, Interdepartmental and Interagency Support," 29 June 1973

Purpose

1. To provide mutually agreed parameters in the pursuit of improving Air Force and Navy interoperability and compatibility towards the enhancement of our combined combat effectiveness.

Background

2. The Departments of the Navy (DON) and Air Force (DAF) have reviewed existing policies on air refueling systems in response to a proposed joint Navy/Air Force air refueling policy suggested by the interservice Air Refueling Systems Advisory Group (ARSAG). This review has concluded that although the separate systems being employed by the Navy, Marine Corps and Air Force have evolved for good and logical reasons, the effect has been a limited interservice compatibility. In an effort to achieve improved aerial refueling interoperability the following policy is adopted.

Provisions

3. DON/DAF Aerial Refueling System Policy:

a. Future development of aerial refueling tanker aircraft will ensure interservice compatibility and interoperability to the maximum extent possible.

(1) As a minimum, all general support tanker aircraft (example - KC-10) will be equipped with aerial refueling systems compatible with both probe and receptacle equipped receiver aircraft. These aircraft will have

independent hose reel and boom systems capable of refueling receiver aircraft throughout the receivers' normal aerial refueling envelope.

(2) Specialized mission tankers (example - carrier-based tankers and tankers to refuel helicopters) need only be compatible with their planned receiver aircraft.

b. Receiver aircraft development will incorporate the system (either probe or receptacle) which best meets their mission requirements.

c. Improvements to existing tanker systems (example - KC-135, etc.) will continue to consider effectiveness, economy, and interoperability to provide for the differing mission and operational requirements of our respective services.

Effective and Termination Dates

4. This Joint Policy is effective immediately and shall remain in effect until amended by mutual written agreement between the Department of the Navy and Department of the Air Force or until terminated in writing by either service.

DEPARTMENT OF THE AIR FORCE

JEROME F. O'MALLEY
Lieutenant General, USAF
Deputy Chief of Staff
Plans and Operations

DEPARTMENT OF THE NAVY

W. L. MCDONALD
Vice Admiral, USN
Deputy Chief of Naval
Operations (Air Warfare)

DATE: 10 JUL 1981

Memorandum of Agreement

9 September 1982

Department of the Navy
Office of the Chief of
Naval Operations
Washington, D.C.

Department of the Air Force
Headquarters, U.S. Air Force
Washington, D.C.

MEMORANDUM OF AGREEMENT ON JOINT USN/USAF EFFORTS TO ENHANCE USAF CONTRIBUTION TO MARITIME OPERATIONS

REFERENCE:

(a) JCS Pub 2, Unified Action Armed Forces (UNAAF)

(b) Defense Guidance FY 1984-1988

(c) Memorandum of Agreement between Chief of Naval Operations and Chief of Staff, USAF, dated 19 Nov 1971

(d) Memorandum of Agreement between Chief of Naval Operations and Chief of Staff, USAF, dated 22 May 1974

(e) Memorandum of Agreement between Chief of Naval Operations and Chief of Staff, USAF, dated 2 Sep 1975

(f) Memorandum of Agreement between Chief of Naval Operations and Chief of Staff, USAF, dated 11 Dec 1979

PURPOSE

1. To accelerate ongoing USN/USAF joint efforts to enhance the effectiveness of maritime operations and, in particular, defense of the sea lines of communications (SLOCs) by utilizing USAF capabilities.

BACKGROUND

2. Reference (a) states that the military commander and the Services have the responsibility to plan for utilization and exploitation of intrinsic capabilities of available forces of all Services. By reference (b), the Secretary of Defense highlighted the need for inter-service cooperation and initiatives for enhanced and increased employment of USAF capabilities in support of SLOC defense. The Secretary of the Navy and Secretary of the Air Force agreed to work closely towards these goals and to direct their Service

Chiefs to take appropriate action to achieve improved force integration.

DISCUSSION

3. As reflected by the Defense Guidance, requisite maritime strength to keep all SLOCs open is an indispensable component of the U.S. military posture. The broadening threat to this essential capability is clearly recognized, and sustained efforts are underway to regain maritime superiority. The combined assets of the Navy and Marine Corps are insufficient to meet the threat in all areas. To obtain the best deterrent value and fighting capability in wartime, a continued effort is needed to prepare for the optimal interaction of Service forces. The Navy and Air Force should, therefore, accelerate their joint efforts to exploit their capabilities to enhance maritime operations in defense of the SLOCs.

4. Since the promulgation of reference (d), numerous joint exercises and joint training operations have been conducted. Evaluation of these operations and assessment of the current threat indicated the Anti-Air Warfare (AAW)/Counter-Air Operations is the mission area in which Air Force capabilities can provide the most immediate gains to maritime operations. The Air Force will also improve its anti-ship capability in support of the Antisurface Ship Warfare (ASUW) mission. The primary element will be a training program to include realistic joint training and exercise activity to insure that any capability established is viable within the current operational framework.

5. There are other maritime mission areas in which Air Force capabilities may provide valuable enhancements to SLOC defense. These include:

a. Indications and Warning (I&W).

b. Surveillance and Targeting.

c. Command, Control and Communications (C^3).

d. Aerial Minelaying.

e. Electronic Warfare (EW)

f. Delivery of Navy Special Warfare Forces

g. Aerial Refueling

OBJECTIVES

6. The principal goal of the U.S. Navy and U.S. Air Force in this joint effort is to enhance the total force capability to conduct maritime operations and, in particular, defense of the SLOCs. In support of this goal, the Navy and the Air Force agree to increase the scope and frequency of joint maritime training and to take necessary planning and programming action to accelerate achievement of the following basic objectives:

a. Improved unit and operator effectiveness in joint maritime operations.

b. Enhanced inter-operability of platforms and systems.

c. Continued joint development of tactical doctrine for maritime operations.

d. Assessment of joint training capabilities and limitations and identification of joint training requirements.

e. Provision of joint USN/USAF maritime warfighting concepts for evaluation by the JCS and the CINCs and for consideration in the JCS allocation of forces.

7. Action. In support of these objectives the Navy and the Air Force will take the following actions:

a. Improve inter-service training and exercising through such measures as:

(1) Additional cross training for appropriate inter-service combat unit crewmembers.

(2) Increased inter-service participation in scheduled exercises on instrumented training ranges.

(3) Increased inter-service use of tactical schools and trainers.

(4) Increased integration of forces in tactical training exercises, including JCS-sponsored exercises.

b. Increase inter-service technical exchange including efforts to identify mutually enhancing capabilities and joint development and procurement opportunities to improve the effectiveness of both services.

c. Develop improved tactics and tactical doctrine through experience in joint exercises.

d. Develop joint requirements for inter-service training and exercises, including joint initiatives for new or improved tactical ranges and schools.

e. Seek expanded JCS sponsorship of exercises which provide opportunities for joint USN/USAF operations at sea.

f. Introduce joint maritime warfighting concepts as they are developed, for evaluation by the JCS and the CINCs, and for JCS force allocation, as appropriate.

g. Coordinate force planning and programming to support mutual reinforcement in maritime operations.

8. Effective Date. This agreement is effective immediately and shall remain in effect until amended by mutual written agreement between the Navy and the Air Force. This agreement supplements references (c-f).

Chief of Naval Operations

Chief of Staff, U.S. Air Force

Memorandum of Understanding

23 July 1976

MEMORANDUM OF UNDERSTANDING

BETWEEN

THE DEPARTMENT OF THE NAVY

AND

THE DEPARTMENT OF THE AIR FORCE

References:

a. Amended Program Decision Memorandum (APDM) for the Department of the Air Force, 20 August 1975.

b. Joint AFR 400-27/SECNAVINST 4000.20B, "Basic Policies and Principles for Interservice, Interdepartmental and Interagency Support," 29 June 1973.

c. Department of Defense Directive 4000.19, "Basic Policies and Principles for Interservice, Interdepartmental and Interagency Support," 27 March 1974.

d. Department of Defense Manual 4000.19, "Defense Retail Interservice Support Manual," October 1974.

e. Unified Action Armed Forces (JCS Pub No. 2), October 1974.

f. Joint AFR 172-3/SECNAVINST 7020.4C, "Financial Administration Host-Tenant Relationships," 27 December 1974.

g. AFM 173-10, "USAF Cost and Planning Factors."

h. DODI 2140.1 "Pricing of Sales of Defense Articles and Defense Services to Foreign Countries and International Organizations," 17 June 1975.

PURPOSE

1. To provide mutually agreed parameters within which Interservice Support Agreements (ISAs) will be developed to establish Air Force refueling support for transoceanic flights of Department of the Navy aircraft and Foreign Military Sales aircraft.

BACKGROUND

2. The Department of the Navy a requirement for air refueling services from large capacity jet tanker aircraft in support of transoceanic flights of its tactical aircraft, including aircraft delivered to other countries under Foreign Security Assistance programs. The Secretary of Defense by reference (a) directed the Air Force to support the Department of the Navy in such operations.

DISCUSSION

3. The Navy envisions that in peacetime, refueling services will be required primarily in support of carrier air wing "swings", delivery of attrition replacement aircraft if required, delivery of selected aircraft sold to foreign countries, and aircrew training incident thereto. There is no intent to conduct a continuous training program to keep Naval aviators qualified to refuel from Air Force tankers for contingency or wartime transoceanic aircraft movements. Initial pilot qualification incident to such movement would take place prior to the event.

4. In regard to this memorandum, the Marine Corps has a limited peacetime requirement for external refueling support of transoceanic movements when the nonavailability of enroute bases precludes the use of Marine Corps aerial refuelers.

5. Refueling support for crisis or wartime Department of the Navy requirements will be requested through the Joint Chief of Staff (JCS) for prioritization and allocation of resources as necessary.

GENERAL PROVISIONS

6. Interservice Support Agreements (ISAs) and implementing procedures will be developed between appropriate Naval and Air Force commands within the guidelines contained in the references and following attachments:

a. Mission Scheduling - Attachment 1

b. Fuel Requirement Forecasts - Attachment 2

c. Cost Responsibility - Attachment 3

d. Aircraft Certification - Attachment 4

e. Aircrew Qualification - Attachment 5

f. Deployment Management - Attachment 6

g. Command Control and Execution - Attachment 7

h. Technical Manuals - Attachment 8

EFFECTIVE AND TERMINATION DATES

7. This Memorandum of Understanding is effective immediately and shall remain in effect until amended by mutual written agreement between the Department of the Navy and the Department of the Air Force or until terminated in writing by either Service.

Department of the Air Force

OTIS C. MOORE, Maj Gen, USAF
Asst Deputy Chief of Staff
Plans and Operations

Department of the Navy

F. S. PETERSEN
Vice Admiral, U. S. Navy
Deputy Chief of Naval
Operations (Air Warfare)

Date: 23 July 1976

Memorandum of Understanding

19 September 1983

MEMORANDUM OF UNDERSTANDING

BETWEEN

THE DEPARTMENT OF THE NAVY

AND

THE DEPARTMENT OF THE AIR FORCE

References:

a. Amended Program Decision Memorandum (APDM) for the Department of the Air Force, 20 August 1975.

b. Joint AFR 400-27/SECNAVINST 4000.20B, "Basic Policies and Principles for Interservice, Interdepartmental and Interagency Support," 29 June 1973.

c. Department of Defense Directive 4000.19, "Basic Policies and Principles for Interservice, Interdepartmental and Interagency Support," 27 March 1974.

d. Department of Defense Manual 4000.19, "Defense Retail Interservice Support Manual," October 1974.

e. Unified Action Armed Forces (JCS Pub No. 2), October 1974.

f. Joint AFR 172-3/SECNAVINST 7020.4C, "Financial Administration of Interservice and Interdepartmental Support Agreement," 27 December 1974.

g. AFM 173-13, "USAF Cost and Planning Factors Guide," 1 February 1982.

h. DODI 2140.1, "Pricing of Sales of Defense Articles and Defense Services to Foreign Countries and International Organizations," 17 June 1975.

i. AFR 55-17, "Flight Delivery Procedures," 15 Apr 80.

j. AFR 55-47, "Air Refueling Management (KC-135/ KC-10)," 26 May 81.

k. Memorandum of Understanding (MOU) on Improving Air Force and Navy Interoperability and Compatibility, 10 Jul 81.

l. Memorandum of Agreement on Joint USN/USAF Efforts for Enhancement of Jcint Cooperation, 10 Sep 82.

PURPOSE

1. To provide mutually agreed parameters within which an Interservice Support Agreement (ISA) will be developed to establish Air Force air refueling and aircraft delivery support for Department of the Navy aircraft (USN/USMC) and Navy Foreign Military Sales aircraft deliveries.

BACKGROUND

2. The Department of the Navy has received air refueling services in support of carrier air wing "swings", delivery of attrition replacement aircraft, delivery of aircraft sold to foreign countries, and aircrew familiarization training incident to those activities. The Marine Corps also has received support on a limited basis when movements precluded use of organic aerial refuelers (KC-130s). Support beyond these parameters has required case-by-case waiver to the previous agreement.

DISCUSSION

3. While there is no intent to conduct a continuous training program to keep Naval aviators qualified to refuel from Air Force tankers nor establish Air Force delivery control for all overseas Navy/Marine Corps movements, this agreement expands approval for tanker support to include exercise activity and a familiarization training program for major naval deployments into broad ocean areas (BCA).

4. Peacetime refueling services as identified in paragraph 2 above will continue.

5. Refueling support for crisis, contingency or wartime Department of the Navy requirements will be requested through the Joint Chiefs of Staff (JCS) for prioritization and allocation of resources as necessary.

GENERAL PROVISIONS

6. ISAs and implementing procedures will be developed between appropriate Naval and Air Force commands within the guidelines contained in the references and following attachments:

a. Forecasting and Scheduling - Attachment 1

b. Exercise Participation - Attachment 2

c. Fuel Requirement Forecasts - Attachment 3

d. Cost Responsibility - Attachment 4

e. Aircraft Certification - Attachment 5

f. Aircrew Qualification - Attachment 6

g. Deployment Management - Attachment 7

h. Command Control and Execution - Attachment 8

i. Technical Manuals - Attachment 9

EFFECTIVE AND TERMINATION DATES

7. This MOU supersedes the MOU dated 23 July 1976, is effective immediately and shall remain in effect until amended by mutual written agreement between the Department of the Navy and the Department of the Air Force or until terminated in writing by either Service.

Department of the Air Force

RICHARD A. BURPEE,
Maj Gen, USAF
Asst Deputy Chief of Staff
Plans and Operations

Department of the Navy

R. F. SCHOULTZ
Deputy Chief of Naval
Operations (Air Warfare)

Headquarters United States
Marine Corps

Date: 19 SEP 1983

W. H. FITCH
Lieutenant General, U. S.
Marine Corps
Deputy Chief of Staff for
Aviation

FORECASTING AND SCHEDULING

1. In order for the Air Force to program for sufficient support capability over the long term, estimates for annual support will be provided by the Navy/Marine Corps in accordance with AFR 55-47 "Air Refueling Management." In the near term, the Air Force (SAC and 2ADG) will be provided the necessary activity forecasts for integration with other unit moves, training or exercise commitments in order to establish a mutually agreeable refueling support program.

2. Familiarization air refueling training under SAC's "BUSINESS EFFORT" support program will only be accomplished as required incident to the approved activity identified in the basic MOU paragraphs 2 and 3. In no instance will this training be furnished earlier than six months prior to the driving requirement.

3. Navy/Marine Corps air refueling support requests must be approved by CNO/CMC. They have established the following priorities for the use of tanker support:

a. Transoceanic deployments (TRANSLANT/TRANSPAC): carrier air wing swings, delivery of attrition replacement aircr t, support for major naval deployments into BO.. and unit deployments.

b. Foreign Military Sales deliveries

c. Exercise participation and/or movements for exercise participation

4. Refueling support for crisis or wartime USN/USMC requirements will be as requested by the Unified Commander in accordance with established JCS prioritization and allocation of tanker resources.

Atch 1

EXERCISE PARTICIPATION

1. The benefits of joint AF/USN/USMC interplay during exercises have proven invaluable. For that reason, this revised MOU allows exercise air refueling support for Naval aircraft including deployments for exercise participation.

2. Air Force air refueling support for USN/USMC units participation in exercise play is accomplished with the approval of CNO/CMC. Since funded tanker flying hours fall short of the demand, CNO/CMC control the hours allotted for USN/USMC. Accordingly, CNO/CMC will approve air refueling support on a case-by-case basis for their respective units based on overall allotment, usage rate and priority (see Atch 1); and will charge the hours used by USN/USMC aircraft to the USN operational command to which the exercise is attached.

3. Tanker support during exercises will be provided by the Air Force under the following guidelines:

a. CNO/CMC approval.

b. USN/USMC representation at the planning conference for the respective exercise in which they plan to participate

c. USN/USMC organic refueling support not adequate or available.

d. Only that refueling necessary to meet exercise mission objectives will be accomplished.

4. Tanker support for aircraft movements in order to participate in exercises are worked through TAC 2nd Aircraft Delivery Group (see Atch 7).

Atch 2

FUEL REQUIREMENT FORECASTS

1. The Department of the Navy will be responsible for providing implementing instructions for forecasting requirements for all USN and USMC activities. Forecasting of requirements will be under the guidelines established in AFR 55-47, "Air Refueling Management." The Department of the Navy and U.S. Marine Corps will provide forecasted requirements for in-flight refueling for the next fiscal year, and the following 5 fiscal years, in order for Headquarters SAC to plan refueling programs toward authorized resources (funding appropriations). These forecasted requirements should concurrently be provided to SAALC/SFR, Kelly AFB, T. 78241, for their use in programming necessary fuel supplies in the Air Force Stock Fund. The Navy point of contact for forecasting requirements will be CNO, ATTN: OP-508, Washington, DC 20350; for the Marine Corps, Headquarters Marine Corps, ATTN: Code APP, Washington, DC 20380.

2. Individual in-flight refueling requests will be submitted by the appropriate Navy activity direct to Headquarters SAC, Offutt AFB, NE 68113, ATTN: DO8. Requests will be sent by message, to arrive at SAC in accordance with the SAC cheduling program. Requests to change any of the forecasted support requirements will be sent to the same offices (i.e., Headquarters SAC and SAALC/SFR).

3. All Department of the Navy in-flight refueling requests will include the following billing data for each refueling being requested:

a. DODAAC of Squadron or Station of Aircraft to be refueled

b. Signal Code

c. Fund Code

d. Tail Number of Aircraft

e. Aircraft Type

f. Julian Date Refueling to occur

g. Locally Assigned 4-Digit Serial Number

(NOTE: Items a-e are identical to the information in the DOD Avfuels Identaplate as described in NAVSUPINST 7300.28.)

Atch 3

4. The substitution of any aircraft, or change in billing information from the original in-flight refueling request will be reported to HQ SAC/DO8 by message.

5. The base providing refueling support will bill the DODAAC (as listed in the refueling request) through normal interfund billing procedures for the avfuel provided.

6. Air Force points of contact are: HQ USAF/XOOTS, Wash DC, AV 227-1666; HQ USAF/LEYSF, Wash DC, AV 225-0461; and HQ SAC/DO8, Offutt AFB NE, AV 271-4857.

COST ACCOUNTABILITY

1. The Air Force will provide manpower and tanker flying hour allocations to support Department of the Navy aerial refueling and aircraft delivery requirements. Reimbursements will be based on the net identifiable additional costs to the Department of the Air Force for offloads of aviation fuel to Navy aircraft. These costs will be billed separately to the Department of the Navy by SF 1080.

2. For any special refueling support required by the Department of the Navy which would necessitate unique basing of tankers, the appropriate Navy Fleet Commander-in-Chief, Commanding General Fleet Marine Force and the Air Force Major Command Commander will negotiate on the net additive costs of TDY for tanker personnel incurred solely to provide such refueling. The Department of the Navy will provide Category One Military Interdepartmental Purchase Requests (MIPRs) to the Air Force Major Command when agreement has been reached for any unusual costs.

3. The Air Force Major Commands will bill the Department of the Navy on a monthly basis by means of a SF 1080 supported by listings of individual reimbursable expenses incurred within the amounts authorized by the major subdivisions of expenses set forth in the applicable MIPR (DD Form 448). Duplicate copy of the monthly SF 1080 with supporting documentation identifying individual charges by Unit Identification Code and bureau number of the receiver aircraft, and/or by other subdivision of expenses authorized in the applicable MIPR, will be forwarded to the appropriate MIPR issuing office for certification for payment, and to the designated Authorization Accounting Activities.

4. The Department of the Navy will provide Category One MIPRs to the Air Force for all costs incurred by the Air Force to support the movement of aircraft to foreign countries, including enroute maintenance costs in the CONUS for Foreign Security Assistance programs. These costs will be totally reimbursable to the Department of the Air Force. Accounting procedures and costs of flight deliveries to other governments are outlined in AFR 177-112, AFR 400-3 and AFM 170-3 (also see DODI 2140.1) and other DOD instructions.

Atch 4

AIRCRAFT CERTIFICATION

1. The compatibility between Navy tactical aircraft and Air Force tankers shall be determined before sorties are flown. This determination will apply to the appropriate aircraft in the active inventory and those under development which are soon to enter operational status. The Air Force (AFSC) shall examine technical data supplied by the Navy (NAVAIRSYSCOM) on each involved aircraft to establish compatibility prior to any certification sorties.

2. The Air Force will provide tanker sorties to allow the Navy receiver aircraft to demonstrate an air refueling compatibility. Such tests will be conducted by the Air Force Flight Test Center (AFFTC/Edwards AFB, CA) in coordination with NAVAIRSYSCOM. AFFTC has an instrumented tanker to conduct and monitor this activity along with qualified flight test crews and engineers to perform the tests and interpret the results. Such tests will be flown in accordance with an approved test plan.

3. The following Navy tactical aircraft have demonstrated compatibility with the Air Force KC-135: A-3, A-4, A-5, E/A-6, A-7, F-4, F-8, KA-3, F-14 and S-3A. KC-10: A-4, E/A-6, A-7, F-4, F-14, S-3A, AV-8A/C and F/A-18. Based on the success of the KC-10 demonstrations, the Navy has cleared all USN/USMC receivers for operations with the KC-10 except the AV-8B.

4. Certification flights shall be performed by flight test crews qualified and current in air refueling and shall include the number of sorties, aircraft configurations, and environmental conditions as stated in the test plan.

Atch 5

AIRCREW QUALIFICATION

1. All receiver pilots shall be NATOPS qualified in aerial refueling from Navy/Marine tankers before operations with Air Force tankers are undertaken.

2. For missions which require qualification sorties, briefing and ground training supervision will be conducted by an instructor pilot qualified in Air Force receiver refueling. In addition, the Air Force (SAC) will provide a tanker briefing on the unique aspects of KC-135/KC-10 air refueling and conduct discussions on rendezvous and peculiar scenario requirements. Inflight supervision will be the responsibility of the Navy/Marine Corps. Services will work in harmony to insure that an effective and successful qualification program is established.

3. A minimum of one USAF refueling within the 90-day period prior to overwater deployment will be required to demonstrate qualification. If aircrew is scheduled to deploy with a KC-135, this qualification sortie will be with a KC-135.

4. Other aircrew qualifications will be as agreed in the ISA.

Atch 6

DEPLOYMENT MANAGEMENT

1. The Air Force Major Command Commander and Navy Fleet Commander-in-Chief, or Commanding General Fleet Marine Force, will establish the appropriate level of deployment management procedures necessary to insure the safe movement of USAF/USN/USMC aircraft for all required operations.

2. The appropriate Fleet Commander-in-Chief/Commanding General Fleet Marine Force will provide the following data to SAC and TAC in advance of each scheduled deployment: number and type of aircraft, desired dates for movement assistance, departure and arrival points, desired cruise altitude and airspeed, and fuel onload required. TAC Second Aircraft Delivery Group (2ADG) will use this data to develop flight profiles and will disseminate the flight profile information following existing procedures with the addition of Navy addressees as required. All USN/USMC aircraft movements will be worked through 2ADG in accordance with appropriate procedures stated in AFR 55-17.

Atch 7

COMMAND, CONTROL AND EXECUTION

1. Command of aviation forces conducting deployment air refueling operations will remain with the command to which the forces are attached for duty.

2. CINCSAC and Commander TAC will normally execute and direct activities of their units through their respective command posts. Naval forces will remain under the operational control of the appropriate Fleet Commander-in-Chief and all significant enroute delays or problem areas shall be referred to that level for coordination and resolution. During the delivery phase of missions, 2ADG exercises the control over aircraft to launch, continue, divert or terminate delivery flights. A close liaison between the Services on all operational matters is required to insure mission success.

3. During conduct of the airborne portion of the mission, special circumstances may dictate immediate decisions to deviate from the mission plan for which prior coordination with applicable command posts cannot be effected. For this reason, control of the combined receiver-tanker force must be vested in the airborne tanker task force commander along the common portion of the route. This will include the period subsequent to positive radio contact between the tanker cell leader and the receiver leader during rendezvous, until the end of the refueling or termination of route cell formation, as applicable. Under all circumstances the airborne tanker task force commander must coordinate with the receiver mission commander to insure that all decisions affecting the receiver aircraft are based on the most accurate and timely information available, and are in the best interest of the combined force. Abort/divert decisions for receiver aircraft may be made by the receiver flight leader.

Atch 8

TECHNICAL MANUALS

1. Refueling procedures will be developed and documented to achieve maximum standardization and usage of common terminology. The USN NATOPS Air Refueling Manual and Air Force Technical Order 1-1C-1 shall be expanded as necessary to standardize the refueling procedures required by this interservice mission.

2. The Air Force shall hold discussions with appropriate Naval agencies to develop the required procedures and amendments to existing Service refueling manuals. Agreement shall be reached on the amendments pertaining to this joint mission before inclusion in the technical manuals.

Atch 9

Memorandum of Understanding

16 November 1988

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF
NAVAL OPERATIONS
WASHINGTON, D.C.

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, U.S. AIR FORCE
WASHINGTON D.C.

MEMORANDUM OF UNDERSTANDING
between
THE DEPARTMENT OF THE NAVY
and
THE DEPARTMENT OF THE AIR FORCE
on
AIR REFUELING SUPPORT FOR NAVY OPERATIONS

References:

a. JCS PUB 2, Unified Action Armed Forces (UNAAF), Dec 1986

b. Defense Guidance, FY 1990-1994, Mar 1988

c. Memorandum Of Agreement On Joint USN/USAF Efforts To Enhance USAF Contribution To Maritime Operations, Sep 1982

d. Memorandum Of Understanding Between The Department of The Navy And The Department Of The Air Force, Sep 1983

e. DoD 4000.19-R, Defense Regional Interservice Support Regulation, Mar 1984

PURPOSE

1. This Memorandum of Understanding (MOU) broadens the scope of previous agreements and provides for realistic training and development of employment concepts and tactics appropriate for joint operations. Specifically, mutually agreed upon policy guidance and general responsibilities for Air Force peacetime air refueling of Navy operational and training missions as well as Navy Foreign Military Sales (FMS) aircraft deliveries are provided.

BACKGROUND

2. References (a) and (b) highlight the need for interservice initiatives to take advantage of Air Force capabilities and their potential contributions to defense of sea lines of communication (SLOC). Reference (c) formalizes an agreement between the Chief of Naval Operations, Department of the Navy and the Chief of Staff, Department of the Air Force, to accelerate initiatives to enhance maritime operations. Reference (d) provided mutually agreed upon guidelines for the development of Interservice Support Agreements (ISAs) establishing Air Force air refueling support for Department of the Navy aircraft as well as support for Navy FMS aircraft deliveries. It did not provide for integrated training of Air force land-based tanker (LBT) assets and Navy air wing crews during predeployment workup or proficiency training while the crews are deployed. It also did not address the development of tactics for both offensive and defensive operations associated with LBT maritime support, or the operational/training support of Navy strategic communication assets (E-6A). This MOU adds these provisions and supersedes reference (d).

DISCUSSION

3. During times of crisis, contingency, mobilization, or war, Air Force LBT support for Navy requirements will be requested by the Unified CINCs through the Joint Chiefs of Staff (JCS) for prioritization and allocation of resources.

4. During peacetime, the Air Force will provide timely and responsive LBT support for Navy/Marine operational and training requirements as a normal function of Air Force - Navy/Marine operations. Peacetime LBT support is budgeted by the Air Force in the Program Objective Memorandum (POM) process and is constrained by available tanker flying

hours. Within this constraint, the Air Force will provide LBT support for the following Navy missions:

a. Support of E-6A operational and initial qualification training requirements.

b. Support of carrier battle group and Navy/Marine air wing offensive and defensive tactical exercises, operational readiness inspections, unit deployments, training events, and delivery of attrition replacement aircraft.

c. Support of carrier air wing "swings" and delivery of FMS aircraft to foreign countries.

d. Support of rapid intra-theater and intercontinental deployment/redeployment of reinforcement aircraft for carrier battle groups and overseas installations.

5. Recurring LBT employment in a training environment is the key element to optimizing the expanded role of LBT assets in support of Navy requirements. Training objectives are to familiarize aircrews and operational planners with Navy and Air Force interoperability requirements, train aircrews in expanded mission profiles, and maintain aircrew proficiency. These objectives will be accomplished through LBT operations under the operational control of CINCSAC in support of deployed and non-deployed carrier battle groups, as well as E-6A strategic communications operations. Tactical control of LBT operations in support of carrier battle groups will be executed by the carrier battle group commander (IAW JCS Pub 2).

GENERAL PROVISIONS

6. Implementing guidance and responsibilities of the appropriate Navy and Air Force commands are contained within the following attachments:

a. Forecasting and Scheduling - Attachment 1.

b. Exercise Participation - Attachment 2.

c. Fuel Requirement Forecasts and Billing - Attachment 3.

d. Cost Responsibility - Attachment 4.

e. Aircraft Certification - Attachment 5.

f. Aircrew Qualification - Attachment 6.

g. Deployment Management - Attachment 7.

h. Command Control and Execution - Attachment 8.

i. Technical Manuals - Attachment 9.

j. Operational Concepts - Attachment 10.

7. Interservice Support Agreements in support of these attachments will be developed as necessary between appropriate Air Force and Navy Commands/Claimants under the provisions of reference (e), but must remain within the guidelines established by this agreement.

EFFECTIVE AND TERMINATION DATES

8. This MOU supersedes the MOU dated 19 September 1983, is effective immediately and shall remain in effect until amended by mutual written agreement between the Department of the Navy and the Department of the Air Force, or until terminated in writing by either service. Such written notification shall precede termination by not less than 90 days. MOU attachments may be revised without impacting the basic MOU.

DEPARTMENT OF THE AIR FORCE

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DEPARTMENT OF THE NAVY

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Deputy Chief of Staff
for Aviation

Date: 16 NOV 1988

FORECASTING AND SCHEDULING

1. Navy/Marine Corps air refueling support requests must be approved by the CNO/CMC, or their designated representatives, and will be in accordance with the following priorities:

a. Support of E-6A operational and initial qualification training requirements.

b. Support of carrier battle group and Navy/Marine air wing offensive and defensive tactical exercises, operational readiness inspections, unit deployments, training events, and delivery of attrition replacement aircraft.

c. Support of carrier air wing "swings" and delivery of FMS aircraft to foreign countries.

d. Support of rapid intra-theater and intercontinental deployment/redeployment of reinforcement aircraft for carrier battle groups and overseas installations.

2. Familiarization air refueling training under SAC's "BUSINESS EFFORT" support program will only be accomplished as required incident to the approved activity identified in subparagraph 1c and 1d above. In no instance will this training be furnished earlier than 90 days prior to the driving requirement. Training support for the development of employment concepts and tactics appropriate for joint operations will be conducted in conjunction with planned exercises or in preparation for JCS directed joint operations. All operational and initial aircrew qualification training requirements for the E-6A will be supported. If continuation training requirements develop, support will be provided at the same level relative to other users.

3. Refueling support for crisis or wartime USN/USMC requirements will be as requested by the Unified Commander in accordance with established JCS prioritization and allocation of tanker resources.

4. In order for the Air Force to program for sufficient air refueling support capability, estimates for annual support will be provided by the Navy/Marine Corps in accordance with AFR 55-47 "Air Refueling Management." CNO, CINCLANTFLT, CINCPACFLT, CINCUSNAVEUR, and CMC will provide a forecast of USAF air refueling support requirements for the next fiscal

year and the following five fiscal years. The first three fiscal years must be broken out by date(s) or fiscal quarters. This annual forecast must be received by 30 June of each year. At least 90 calendar days prior to the next quarter the forecasting agencies will update and/or confirm their support requirements by message. In addition, fifty-five calendar days prior to each quarter all known specific information for scheduling the requested air refueling support and a point of contact for mission planning will be provided by the forecasting agency. The above requests will be sent to HQ SAC OFFUTT AFB NE//DONA/DONT//, HQ 2ADG LANGLEY AFB VA//DOX// (FOR TRANSLANT/TRANSPAC) INFO appropriate DON agencies as desired and 8AF BARKSDALE AFB LA//DOO//, 7AD RAMSTEIN AB GE//DO8// or 15AF MARCH AFB CA//DOT//, 3AD ANDERSEN AFB GU//DO8//, as applicable.

5. Cancellations must be forwarded ASAP and unscheduled short-notice requirements must be requested and coordinated with HQ SAC/DONT, and for movements, 2ADG/DOX.

6. HQ SAC will review air refueling requirements and provide concurrence/nonconcurrence to the originator within 30 calendar days. HQ SAC/DON will determine the number of tanker sorties required to support Department of the Navy (DON) requested air refueling requirements. By sixty-three calendar days prior to each quarter, HQ SAC/DONA will provide each forecasting agency with its approved tanker support sortie allocation. HQ SAC/DONA will also maintain an accountability system that quantifies the tanker support sorties provided to each agency and will provide data each month on tanker support.

7. All DON forecasts/requests for air refueling support must be approved by and submitted by the designated forecasting agencies to HQ SAC/DONA. Forecasts from other than these agencies will not be included in the tanker flying hour program and will not be allocated tanker support sorties. Air refueling support forecast message should conform to the sample provided below. Variations are authorized, however, failure to include the required information may result in a less than required tanker support allocation.

8. The safety hazards created by introducing JP-4 fuel into the carrier environment have been fully documented. Even with relatively small percentages of JP-4, the lowered mixed-fuel flash point presents unacceptable risks except in isolated or emergency cases. If mutually agreed and coordinated in advance between HQ SAC and receiver units, JP-5 fuel will be provided to carrier based aircraft. Navy AAR support requests will indicate when JP-5 fuel is required.

SAMPLE MESSAGE FORMAT FOR FORECASTING AAR REQUIREMENTS

FROM: CINCLANTFLT/CINCPACFLT/CINCUSNAVEUR/CMC (as applicable)

TO: HQ SAC OFFUTT AFB NE//DONA//

CNO WASHINGTON DC//OP-505 G//

CLASSIFICATION

SUBJ: CINCLANTFLT/CINCPACFLT/CINCUSNAVEUR/CMC (as applicable)

USAF TANKER SUPPORT FORECAST/UPDATE (as applicable)

REF: (as appropriate)

1. THE FOLLOWING USAF TANKER REQUIREMENTS ARE SUBMITTED FOR FY____THROUGH FY____: (NOTE: 30 JUNE FORECAST IS FOR 6 FISCAL YEARS. 90 CALENDAR DAYS PRIOR TO QUARTER UPDATES ARE FOR CURRENT YEAR OR NEXT FISCAL QUARTER.

A. OPERATIONS/CFCTS/EXERCISES: (NOTE: DON AGENCIES WILL FORECAST FOR USMC EXERCISE REQUIREMENTS.) TO ACCURATELY DETERMINE THE NUMBER OF TANKER SORTIES REQUIRED TO SUPPORT A PARTICULAR EXERCISE, WE MUST BE ABLE TO IDENTIFY THE NUMBER OF AAR EVENTS OR TIMES A TANKER WILL BE REQUIRED - TOTAL TANKER TIME ON STATION AND TOTAL OFFLOAD ARE NOT SUFFICIENT TO IDENTIFY THE NUMBER OF TANKER SORTIES. FOR EXAMPLE, IF A FIVE DAY EXERCISE IS PLANNED WITH USAF TANKER SUPPORT ON EACH DAY THAT REQUIRES THE TANKER ON STATION FOR A THREE HOUR PERIOD WITH AN OFFLOAD CAPABILITY OF 60,000 POUNDS, WE NEED THIS INFORMATION TO IDENTIFY TANKER SORTIE REQUIREMENTS. IN ADDITION, IF ON A PARTICULAR DAY OF THE EXERCISE, TWO OR MORE AAR EVENTS ARE PLANNED THAT HAVE

DIFFERENT TANKER ON STATION TIMES (I.E., 0900-1200; 1600-1900) DO NOT COMBINE THEM TO SHOW A TOTAL TIME ON STATION OF SIX HOURS, SHOW THEM SEPARATELY OR AS DIFFERENT AAR EVENTS. IF REQUIREMENTS VARY FROM DAY-TO-DAY OR FROM AAR EVENT TO EVENT THEN EACH SHOULD BE BROKEN OUT SEPARATELY. IN THE ABOVE EXAMPLE, FIVE TANKER SORTIES WOULD BE REQUIRED TO SUPPORT THE EXERCISE. THE ONLY OTHER VARIABLE THAT MAY AFFECT TANKER SORTIE REQUIREMENTS IN THE EXAMPLE WOULD BE THE LOCATION OF THE AAR TRACK/AREA. A SUGGESTED FORMAT FOR EXERCISE FOLLOWS WHERE EVENTS IS THE NUMBER OF AAR EVENTS; TOS REPRESENTS THE REQUIRED TANKER TIME ON STATION IN HOURS; OFFLD IS THE FUEL OFFLOAD PER EVENT; TOT OFFLD IS THE TOTAL OFFLOAD FOR THE EXERCISE.)

DATE(S) EXERCISE NUMBER/TYPE TRACK/AREA EVENTS/TOS/
DESIGNATION RECEIVERS OFFLD/TOT OFFLD

B. TRANSOCEANIC MOVEMENT(S) (NOTE: ALL AGENCIES FORECAST FOR THEIR RESPECTIVE REQUIREMENTS).

DATE(S) UNIT MISSION FROM/TO NUMBER/TYPE OFFLOAD
DESIGNATION RECEIVERS

C. TRAINING (NOTE: ALL AGENCIES FORECAST FOR THEIR RESPECTIVE REQUIREMENTS. AS IN FORECASTING FOR EXERCISES, INFORMATION CONCERNING THE NUMBER OF AAR EVENTS, TIME ON STATION, AND OFFLOAD IS REQUIRED TO DETERMINE TANKER REQUIREMENTS FOR TRAINING. A SUGGESTED FORMAT IS SHOWN BELOW).

DATE(S) UNIT TRACK/AREA EVENTS/TOS/OFFLD/TOT OFFLD

2. POC IS (RANK, NAME, OFFICE SYMBOL, TELEPHONE).

SAMPLE MESSAGE FORMAT FOR DEPLOYMENT/REDEPLOYMENT MISSIONS

FROM: CINCLANTFLT, CINCPACFLT, CINCUSNAVEUR, CMC (as applicable)

TO: HQ SAC OFFUTT AFB NE//DONA/DONT/LGSF//

HQ 2ADC LANGLEY AFB VA//DOX//

INFO: 8AF BARKSDALE AFB LA//DOO// (FOR TRANSLANT'S)

7AD RAMSTEIN AB GE//DO8// (FOR TRANSLANT'S)

15AF MARCH AB GE//DO8// (FOR TRANSPAC'S)

3AD ANDERSEN AFB GU//DO8// (FOR TRANSPAC'S)

(AS APPROPRIATE DON AGENCIES AS DESIRED)

CLASSIFICATION

SUBJ: REQUEST FOR KC-135/KC-10 AAR SUPPORT (REFERENCES AS APPROPRIATE)

1. REQUEST AAR SUPPORT FOR (TRANSPAC/TRANSLANT, AS APPROPRIATE) (MISSION IDENTIFIER, I.E., KEY LANCE 03).

2. MISSION INFORMATION FOLLOWS:

A. UNIT/DATE(S) OF MOVEMENT/DEPARTURE POINT/DESTINATION/ NUMBER AND TYPE OF AIRCRAFT/FUEL OFFLOAD.

B. FERRY CONFIGURATION (NUMBER AND LOCATION OF EXTERNAL TANKS/BLIVITS, RACKS/RAILS, ETC.).

*C. TOTAL ONBOARD FUEL (LBS) AT ENGINE START (DO NOT INCLUDE TAXI).

*D. START, TAXI, TAKEOFF FUEL REQUIRED (LBS).

*E. AVERAGE FUEL TRANSFER RATE FOR RECEIVER ACFT (UTILIZED TO COMPUTE LENGTH OF TANKER TRACK).

*F. OPTIMUM LATITUDE AND AIRSPEED FOR MAXIMUM RANGE PROFILE.

*G. AVERAGE FUEL FLOW (LBS/HR) COMPUTED AT MAXIMUM RANGE.

*H. ENROUTE ALTITUDE/TAS.

*I. FORMATION CLIMBS (INCLUDING IAS/TAS, FUEL UTILIZED, DISTANCE COVERED).

*J. BUDDY CLIMBS WITH KC-135 (COMPUTE AVERAGE CLIMB REQUIRED FOR DISTANCE OF 7INM FROM FL 200 TO FL 350).

*K. DESCENTS (INCLUDE FUEL UTILIZED FOR DESCENT TO PENETRATION POINT FOLLOWED BY INSTRUMENT PENETRATIONS TO DESTINATION).

*L. FUEL AT DESTINATION (RESERVE) AND AT ALTERNATE IF APPLICABLE. (*NOTE: ITEMS C-L WILL BE SUBMITTED ONLY UPON REQUEST OF 2ND ADG).

3. INCLUDE FOLLOWING BILLING INFORMATION ON REQUEST SUBMISSION:

A. DODAAC OF SQUADRON OR STATION OF ACFT TO BE REFUELED.

B. SIGNAL CODE.

C. FUND CODE.

D. TAIL NUMBER/BUREAU NUMBER OF AIRCRAFT.

E. AIRCRAFT TYPE.

F. JULIAN DATE REFUELING TO OCCUR.

G. LOCALLY ASSIGNED FOUR DIGIT SERIAL NUMBER.

(ITEMS A-E ABOVE ARE IDENTICAL TO INFO ON DOD AVFUELS INDENTAPLATE AS DESCRIBED IN NAVSUPOINST 7300.28).

(NOTE: AS A MINIMUM, THE DODAAC/UIC MUST BE INCLUDED IN THE INITIAL SUBMISSION OF BILLING DATA OR REQUEST WILL NOT BE PROCESSED/APPROVED.)

4. AIRCREW CERTIFICATION TRAINING REQUIREMENTS TO INCLUDE: DATE(S)/UNIT/TRACK OR AREA/NUMBER OR RECEIVERS/FUEL OFFLOAD/ TIME TANKER(S) REQUIRED ON STATION. (NOTE: NUMBER OF SORTIES CAN BE ASSUMED TO BE ONE FOR EACH DAY A TANKER IS REQUIRED UNLESS FUEL OFFLOAD AND/OR STATION TIME EXCEEDS THE CAPABILITY OF A SINGLE TANKER.)

5. MISSION PLANNING/COORDINATION POC FOR REQUESTED MOVEMENT.

SAMPLE MESSAGE FORMAT FOR EXERCISES OR TRAINING EVENTS

FROM: CINCLANTFLT, CINCPACFLT, CINCUSNAVEUR, CMC (as applicable)

TO: HQ SAC OFFUTT AFB NE//DONA/DONT/LGSF//

INFO: 8AF BARKSDALE AFB LA//DOO// (AS APPLICABLE)

7AD RAMSTEIN AB GE//DO8// (AS APPLICABLE)

15AF MARCH AFB CA//DOT// (AS APPLICABLE)

3AD ANDERSEN AFB GU//DO8// (AS APPLICABLE)

(APPROPRIATE DON AGENCIES AS DESIRED)

CLASSIFICATION:

SUBJ: REQUEST FOR KC-135/KC-10 AAR EXERCISE/TRAINING SUPPORT (REFERENCES AS APPROPRIATE)

NOTE: SUBMIT NLT 55 CALENDAR DAYS PRIOR TO EACH QUARTER

1. REQUEST KC-135/KC-10 AAR SUPPORT FOR (EXERCISE IDENTIFIER OR TRAINING).

2. MISSION INFORMATION FOLLOWS:

A. DATE(S) REQUIRED (PRIMARY AND ALTERNATE IF APPLICABLE)/ UNIT(S)/NUMBER AND TYPE OR AIRCRAFT.

B. OFFLOAD PER RECEIVER/TOTAL OFFLOAD.

C. AIR REFUELING TRACK/AIR REFUELING ALTITUDE.

D. LOCATION OF AIR REFUELING CONTROL POINT (ARCP-BEGINNING OF TANKER TRACK).

E. END AIR REFUELING POINT.

F. AIR REFUELING CONTROL TIME (COMMENCEMENT TIME-ZULU).

G. COMMUNICATIONS PLAN INCLUDING PRIMARY AND SECONDARY FREQUENCY FOR CONTACTING TANKER.

3. BILLING INFORMATION.

A. DODAAC OF SQUADRON OR STATION OF AIRCRAFT TO BE REFUELED.

B. SIGNAL CODE.

C. FUND CODE.

D. TAIL NUMBER/BUREAU NUMBER OF AIRCRAFT.

E. AIRCRAFT TYPE.

F. JULIAN DATE REFUELING TO OCCUR.

NOTE: AS A MINIMUM, THE DODAAC/UIC MUST BE INCLUDED IN THE INITIAL SUBMISSION OF BILLING DATA OR REQUEST WILL NOT BE PROCESSED/APPROVED.

4. MISSION PLANNING/COORDINATION POC FOR REQUESTED EXERCISE SUPPORT.

EXERCISE PARTICIPATION

1. The benefits of joint AF/USN/USMC interplay during exercises have proven invaluable. For that reason, this revised MOU allows exercise air refueling support for Naval aircraft including deployments for exercise participation.

2. Air Force air refueling support for USN/USMC units' participation in exercise play is accomplished with the approval of CNO/CMC, or their designated representatives. Since funded tanker flying hours fall short of the demand, CNO/CMC will approve air refueling support on a case-by-case basis for their respective units based on overall allotment, usage rate and priority (see Atch 1); and will charge the hours used by USN/USMC aircraft to the USN operational command to which the exercise is attached.

3. Tanker support during exercises will be provided by the Air Force under the following guidelines:

a. CNO/CMC approval.

b. USN/USMC representation at the planning conference for the respective exercise in which they plan to participate.

c. Support necessary to provide for realistic training and development of employment concepts and tactics appropriate for joint operations.

d. Only that refueling necessary to meet exercise mission objectives will be accomplished.

4. Tanker support for aircraft movements in order to participate in exercises are worked through 2nd Aircraft Delivery Group (see Atch 7).

Atch 2

FUEL REQUIREMENT FORECASTS AND BILLING

1. The Department of the Navy will be responsible for providing implementing instructions for forecasting requirements for all USN and USMC activities. Forecasting of requirements will be under the guidelines established in AFR 55-47, "Air Refueling Management." The Department of the Navy and the US Marine Corps will provide forecasted requirements for in-flight refueling for the next fiscal year, and the following 5 fiscal years, in order for Headquarters SAC to plan refueling programs toward authorized resources (funding appropriations). These forecasted requirements should concurrently be provided to SA-ALC/SFR, Kelly AFB, TX 78241, for their use in programming necessary fuel supplies in the Air Force Stock Fund. The Navy point of contact for forecasting requirements will be CNO, ATTN: OP-505 G, Washington, DC 20350; for the Marine Corps, Headquarters Marine Corps, ATTN: Code APP, Washington, DC 20380.

2. Individual in-flight refueling requests will be submitted by the appropriate Navy activity direct to Headquarters SAC, Offutt AFB, NE 68113, ATTN: DON. Requests will be sent by message, to arrive at SAC in accordance with the SAC scheduling program. Requests to change any of the forecasted support requirements will be sent to the same offices (i.e., Headquarters SAC and SA-ALC/SFR).

3. All aircraft shall be able to receive and burn JP-4 fuel. All KC-135s will be configured with the drogue refueling system, except when refueling the E-6A which requires the boom refueling system. If mutually agreed and coordinated in advance between HQ SAC and receiver units, JP-5 fuel will be provided to carrier based aircraft.

4. All Department of the Navy in-flight refueling requests will include the following billing data for each refueling being requested to HQ SAC/DON/LGSF:

a. DOD Activity Address Code (DODAAC) of squadron or station of the aircraft to be refueled. This is a six digit code consisting of the squadron/station Unit Identification Code (UIC) preceded by the service designator (R, V or N) of the squadron or station. If an "R" is cited, all bills will be submitted to Fleet Accounting Disbursing Center, US Pacific Fleet (FAADCPAC). IF a "V" is cited, billing will be submitted to Fleet Accounting and

Atch 3

Disbursing Center, US Atlantic Fleet (FAADCLANT). If an "N" is cited, billing will be to the billing address contained in the Department of Defense Activity Address Directory (DODAAD) for that ashore squadron or station.

b. Signal Code. Will always be "A".

c. Fund Code. This is a two digit code that identifies the funds that will pay for the fuel issued.

d. Tail Number/Bureau Number of Aircraft. This is the tail number or bureau number of the specific aircraft to be refueled. This information should be provided, but if omitted will not preclude proper billing.

e. Aircraft Type. This indicates the type of aircraft to be refueled (e.g., F-14, S-3A).

f. Julian Date. The Julian date that the refueling is to occur.

g. Locally Assigned Four Digit Serial Number. This is an element of the MILSTRIP document number under which the fuel will be billed and provides each issue unique identity in the billing system. The composition of this number is at the discretion of the activity requesting the refueling, but the number may not be duplicated on the same day. It is suggested that refuelings which take place on a given day be serially numbered 0001, 0002, 0003, etc.

(NOTE: Items other than the locally assigned serial number are identical to the information in the DOD Avfuel Identaplate as described in NAVSUPINST 7300.28.)

5. It is imperative that DON activities requesting refueling support provide complete and accurate billing information, and that the Air force refueling units ascertain that such information has been provided prior to the refueling. As a minimum, the DODAAC/UIC must be included in the initial submission or the request will not be approved.

6. The substitution of any aircraft, or a change in billing information from the original in-flight refueling request will be reported to HQ SAC/DON/LGSF by message.

7. The following procedures will be utilized by the base providing refueling support to bill the DODAAC (as listed in the refueling request) for avfuel provided.

a. Standard Procedures. The Air Force will utilize the billing information provided by DON to bill for activities under interfund billing procedures (DOD 4000.25-7-M, Military Standard Billing System, applies).

b. Emergency Procedures. There may be occasional circumstances requiring fuel to be issued on an emergency basis. In such situations, every effort will be made to obtain sufficient billing information to bill under standard interfund procedures. However, if enough information cannot be obtained to utilize interfund billing procedures, the following exception billing procedures apply:

(1) Billing will be by Voucher for Transfers Between Appropriations and/or Funds (SF 1080) and will include all available supporting documentation.

(2) The completed SF 1080 will be forwarded to the Commander, Naval Air Force, US Atlantic Fleet, Norfolk, VA 32511, for refuelings in the Atlantic area; and to the Commander, Naval Air Force, US Pacific Fleet, Naval Air Station, North Island, San Diego, CA 92135, for refuelings in the Pacific area. For purposes of this agreement, the 100th meridian will be the line of demarcation between the Atlantic and Pacific area.

(3) COMNAVAIRPAC and COMNAVAIRLANT will research the information provided with the SF 1080, and in conjunction with any other available information, determine the squadron that received the fuel. The SF 1080 will be annotated with the Unit Identification Code of the squadron and be forwarded to the appropriate Fleet Accounting and Disbursing Center, or appropriate shore activity paying office for payment.

8. Air Force points of contact are: HQ USAF/XOOTS, Washington, DC, 20330, AV 227-4095; HQ USAF/LEYSF, Washington, DC, 20330, AV 225-0461; and HQ SAC/DON, Offutt AFB, NE 68113, AV 271-2765.

COST ACCOUNTABILITY

1. The Air Force will provide manpower and tanker flying hour allocations to support Department of the Navy aerial refueling and aircraft delivery requirements. Reimbursements will be based on the net identifiable additional costs to the Department of the Air Force for offloads of aviation fuel to Navy aircraft. These costs will be billed separately to the Department of the Navy by SF 1080.

2. For any special refueling support required by the Department of the Navy which would necessitate unique basing of tankers, the appropriate Navy Fleet Commander-in-Chief, Commanding General Fleet Marine Force and the Air Force Major Command Commander will negotiate on the net additive costs of TDY for tanker personnel incurred solely to provide such refueling. The Department of the Navy will provide Category One Military Interdepartment Purchase Requests (MIPRs) to the Air Force Major Command when agreement has been reached for any unusual costs.

3. The Air Force Major Commands will bill the Department of the Navy on a monthly basis by means of a SF 1080 supported by listings of individual reimbursable expenses incurred within the amounts authorized by the major subdivisions of expenses set forth in the applicable MIPR (DD Form 448). A duplicate copy of the monthly SF 1080 with supporting documentation identifying individual charges by Unit Identification Code and bureau number of the receiver aircraft, and/or by other subdivision of expenses authorized in the applicable MIPR, will be forwarded to the appropriate MIPR issuing office for certification for payment, and to the designated Authorization Accounting Activities.

4. The Department of the Navy will provide Category One MIPRs to the Air Force for all costs incurred by the Air Force to support the movement of aircraft to foreign countries, including enroute maintenance costs in the CONUS for Foreign Security Assistance programs. These costs will be totally reimbursable to the Department of the Air Force. Accounting procedures and costs of flight deliveries to other governments are outlined in AFR 170-3, DOD 7290.3-M and other DOD instructions.

Atch 4

AIRCRAFT CERTIFICATION

1. The compatibility between Navy/Marine tactical aircraft and Air Force tankers shall be determined before sorties are flown. This determination will apply to the appropriate aircraft and air refueling equipment in the active inventory and those under development which will soon enter operational status. The Air Force (AFSC) shall examine technical data supplied by the Navy (NAVAIRSYSCOM) on each involved aircraft to establish compatibility prior to any certification sorties.

2. The Air Force will provide tanker sorties to allow the Navy receiver aircraft to demonstrate an air refueling compatibility. Such tests will be conducted by the Air Force Flight Test Center (AFFTC/Edwards AFB, CA) in coordination with NAVAIRSYSCOM. AFFTC has an instrumented tanker to conduct and monitor this activity along with qualified flight test crews and engineers to perform the tests and interpret the results. Such tests will be flown in accordance with an approved test plan.

3. Navy aircraft referenced in Air Force Technical Order 1-1C-3 (KC-135) or 1-1C-33 (KC-10) are cleared for operations with the appropriate tanker.

4. Certification flights shall be performed by flight test crews qualified and current in air refueling and shall include the number of sorties, aircraft configurations, and environmental conditions as stated in the test plan.

Atch 5

AIRCREW QUALIFICATION

1. All receiver pilots shall be NATOPS qualified in aerial refueling from Navy/Marine tankers before operations with Air Force tankers are undertaken (except initial aircrew qualification training for the E-6A).

2. For missions which require qualification sorties, briefing and ground training supervision will be conducted by an instructor pilot qualified in Air Force receiver refueling. In addition, the Air Force (SAC) will provide a tanker briefing on the unique aspects of KC-135/KC-10 air refueling and conduct discussions on rendezvous and peculiar scenario requirements. In-flight supervision will be the responsibility of the Navy/Marine Corps. Services will work in harmony to insure that an effective and successful qualification program is established.

3. The following aircrew qualifications shall be met by all receiver pilots (except initial aircrew qualification training for the E-6A):

a. Case One - to refuel from a USAF tanker:

(1) Navy Air Training and Operational Procedures Standardization (NATOPS) program qualification for type aircraft.

(2) NATOPS air refueling qualification for type aircraft (two day and two night contacts/plugs within last 90 days).

(3) Instrument qualified IAW OPNAVINST 3710.7 series.

b. Case Two - transoceanic flight with USAF tanker.

(1) Requirements of Case One.

(2) If transoceanic deployment is to be conducted with a KC-135, a minimum of one KC-135 refueling qualification sortie must be accomplished within a 90 day period prior to actual deployment. If a KC-10 is to be used for transoceanic deployment, the qualification sortie may be accomplished with either a KC-10 or KC-135.

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(3) If KC-135 night refueling operations are anticipated, a minimum of one KC-135 night contact/plug within 90 days, in addition to one KC-135 day contact/plug, is required to demonstrate qualification. If a KC-10 is to be used for night refueling operations either a KC-10 or KC-135 may be used for this qualification.

(4) AFR 55-17 aircrew qualifications should be observed, recognizing differences in USAF, USN and USMC flight time logging procedures.

NOTE: For unit moves, the Major Command (i.e., COMNAVAIRLANT, COMNAVAIRPAC, CG FMFLANT, CG FMFPAC) can waive AFR 55-17 aircrew qualification requirements by message to 2 ADG/DO stating all aircrews are fully qualified for type mission planned.

c. Case Three - for contingency operations (i.e., Indian Ocean operations).

(1) Requirements of Case One.

(2) Two contacts/plugs with USAF tanker within the last 12 months.

d. Case Four - for E-6A initial aircrew qualification training.

(1) An instructor pilot who meets the requirements of Case One, will occupy one of the pilots position at all times during air refueling operations.

(2) Student pilots will receive ground training and briefing by a qualified receiver instructor pilot prior to conducting inflight air refueling.

(3) Student pilots will be knowledgeable of air refueling terminology and procedures.

4. Summary of AFR 55-17 Aircrew Qualifications.

a. Pilot:

(1) Single engine or twin engine fixed wing or helicopter aircraft - 400 hours first pilot/ instructor time. For jet fighter/attack aircraft - inclusive in the 400 hours must be 200 hours jet first pilot/instructor time.

(2) Multi-engine aircraft - 1000 hours total time.

(3) A minimum of 100 hours first pilot/instructor time in design aircraft being delivered.

(4) Twenty (20) hours or ten (10) sorties in 1st 60 days and (10) hours or five (5) sorties in the last 30 days prior to mission.

(5) Command clearance to fly to 300 feet and 1 mile weather minimums.

b. Other crewmembers: Completion of a command approval checkout and a minimum of 25 hours in design aircraft.

DEPLOYMENT MANAGEMENT

1. The Air Force Major Command Commander and Navy Fleet Commander-in-Chief, or Commanding General Fleet Marine Force, will establish the appropriate level of deployment management procedures necessary to insure the safe movement of USAF/USN/USMC aircraft for all required operations.

2. The appropriate Fleet Commander-in-Chief/Commanding General Fleet Marine Force will provide the following data to SAC and TAC in advance of each scheduled deployment: number and type of aircraft desired dates for movement assistance, departure and arrival points, desired cruise altitude and airspeed, and fuel onload required. TAC Second Aircraft Delivery Group (2ADG) will use this data to develop flight profiles and will disseminate the flight profile information following existing procedures with the addition of Navy addressees as required.

3. HQ 2ADG will provide necessary planning and coordination for receiver aircraft (i.e., flight profiles, SAR coordination, flight plans/clearances, and liaison with SAC). A Delivery Control Officer (DCO) will be provided by HQ 2ADG at departure and enroute bases for contingency planning/command and control. HQ 2ADG in coordination with the DCO, will have operational control for launch, continuation, diversion or termination of receiver mission.

4. SAC will provide the necessary tanker air refueling support and manpower at staging or forward operating bases.

5. The following deployment configurations have been established:

A-6E	3 TANKS/4 TANKS (USMC)
EA-6B	4 TANKS
A-7E	2 TANKS
F-14A	2 TANKS
F-4	3 TANKS
A-4/TA-4	2 X 300 TANKS AND 1 X 400 TANK
F/A-18	3 TANKS
AV-8	2 TANKS

If dictated by operational necessity, changes to the standard configuration will be coordinated between designated mission planners for SAC/DON and 2 ADG/DOX NLT 30 calendar days prior to planned departure.

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6. Refuelings should be conducted during daylight hours. Any night refuelings must be mutually agreed upon by each party concerned.

7. During the airborne portion of the mission, the receiver flight leader is required to adhere to the planned and briefed mission profiles. If in-flight changes are required due to unforeseen circumstances, the receiver flight leader will attempt to coordinate changes through the tanker to 2 ADG/DOC. In a rapidly deteriorating or emergency situation, the receiver flight leader is expected to take appropriate action.

COMMAND, CONTROL AND EXECUTION

1. Command of aviation forces conducting deployment air refueling operations will remain with the command to which the forces are attached for duty.

2. CINCSAC and Commander TAC will normally execute and direct activities of their units through their respective command posts. Naval forces will remain under the operational control of the appropriate Fleet Commander-in-Chief and all significant enroute delays or problem areas shall be referred to that level for coordination and resolution. During the delivery phase of missions, 2 ADG exercises the control over aircraft to launch, continue, divert or terminate delivery flights. Unscheduled delays in movements will be relayed via message by 2ADG/DOC to all concerned. General information on movement progress can be obtained by contacting 2ADG/DOC. A close liaison between the Services on all operational matters is required to insure mission success.

3. For LBT operations in support of carrier battle group operations as well as E-6A strategic communications operations, CINCSAC retains operational control of the tanker assets at all times. Tactical control will be executed by the carrier battle group commander (IAW JCS Pub 2).

4. During conduct of the airborne portion of the mission, special circumstances may dictate immediate decisions to deviate from the mission plan for which prior coordination with applicable command posts cannot be made. For this reason, control of the combined receiver-tanker force must be vested in the airborne tanker task force commander along the common portion of the route. This will include the period subsequent to positive radio contact between the tanker cell leader and the receiver leader during rendezvous, until the end of the refueling or termination of route cell formation, as applicable. Under all circumstances the airborne tanker task force commander must coordinate with the receiver mission commander to insure that all decisions affecting the receiver aircraft are based on the most accurate and timely information available, and are in the best interest of the combined force. Abort/divert decisions for receiver aircraft may be made by the receiver flight leader.

5. In the event of DEFCON 3, or as directed by the JCS, SAC may be required to terminate air refueling support.

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TECHNICAL MANUALS

1. Refueling procedures will be developed and documented to achieve maximum standardization and usage of common terminology. The Navy NATOPS Air Refueling Manual and Air Force Technical Order 1-1C-1 shall be expanded as necessary to standardize the refueling procedures required by this interservice mission.

2. The Air Force (SAC) shall hold discussions with appropriate Navy agencies to develop the required procedures and amendments to existing refueling manuals. Agreement shall be reached on the amendments pertaining to this joint mission before inclusion in these manuals.

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OPERATIONAL CONCEPTS

1. Operational concepts and procedures shall be developed jointly to satisfy the operational requirements of Air Force and Navy/Marine forces.

2. Tactics and procedures will be thoroughly coordinated and published in applicable air refueling documents. For continued safe operations, it is imperative that all aircrews participating in joint Air Force and Navy/Marine air refueling operations fully understand and comply with formally stated procedures and guidance.

3. All Air Force tanker crews participating in LBT support of Naval/Marine operations will be thoroughly briefed on the mission to be performed. This may require face-to-face discussions at a mutually agreed upon location prior to mission execution.

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